

TURN YOUR LAPTOP INTO A GAMING POWERHOUSE

WINDOWS ADVISOR

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Best
Windows
laptops of
2017



Reclaim your
privacy in
Windows 10

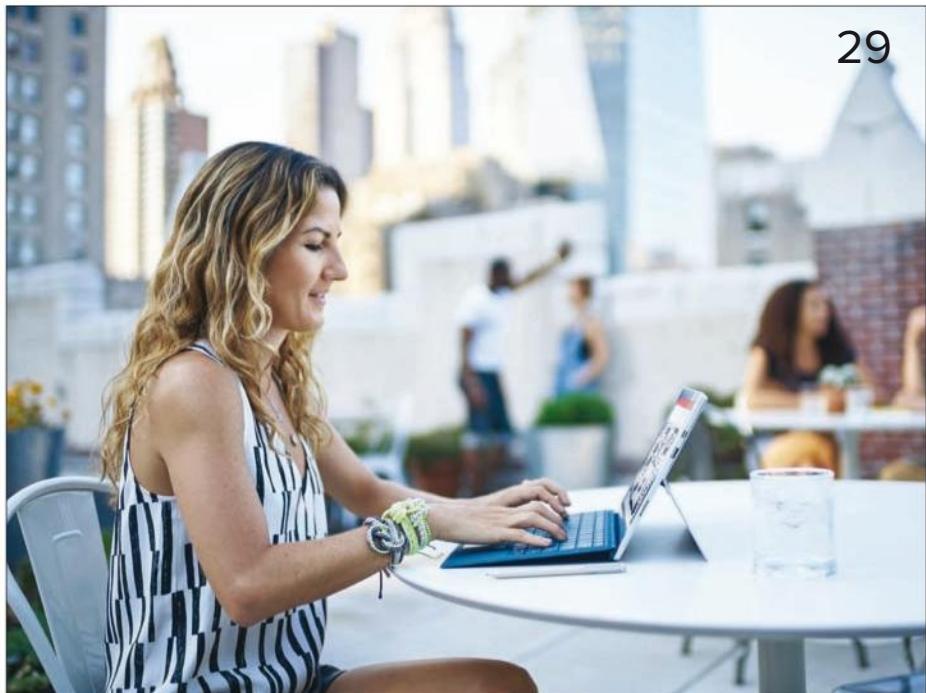


REVIEW:
Gigabyte
Aero 15



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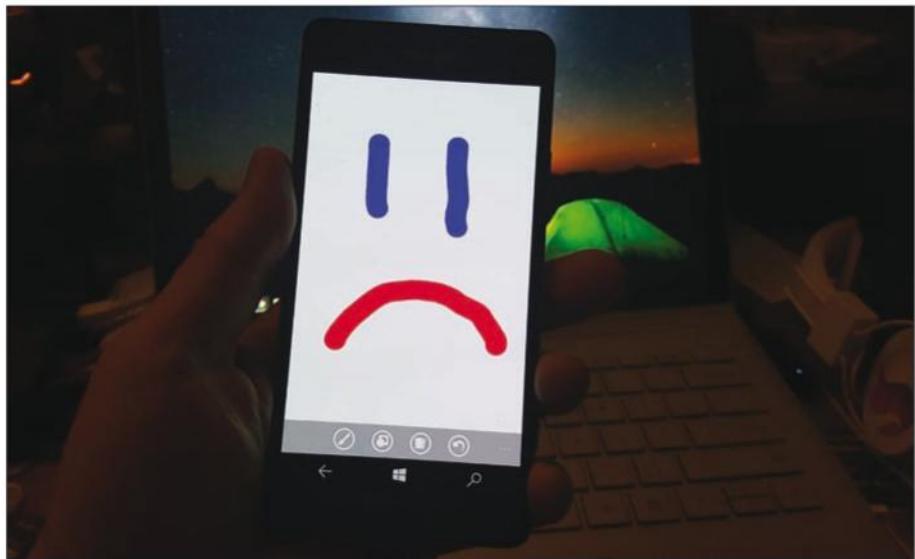
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MS Office sales soar, but Windows Phone fades

Alcatel, HP, and others will now carry the Windows Phone torch, reveals **MARK HACHMAN**



Credit: Mark Hachman

Remember when Microsoft touted Windows Mobile during earnings calls? Now, Microsoft's Windows Phone business is 'immaterial', while Office, Azure, and other cloud and services products continue to propel the company to profitability.

In a small note during its second-quarter earnings report, Microsoft said its phone business had declined \$361 million in revenue from a year ago, leading to the

claim that the phone business was ‘immaterial’, or not enough to report to investors. It wasn’t enough that the firm’s More Personal Computing segment reported a revenue decline of 2 percent to \$8.8 billion: chief financial officer Amy Hood also noted that phones caused a four-percent decline – in other words, Microsoft blamed phones for the company’s loss.

Meanwhile, Microsoft’s mantra of “mobile first, cloud first” has been officially discarded. Chief executive Satya Nadella said the company’s new message of “intelligent cloud and intelligent edge” is resonating with customers everywhere. Given that profits more than doubled to \$6.5 billion on 13 percent revenue growth to \$23.5 billion, that appears to be true.

Microsoft is following the growth, and it’s not in Windows Phones. In 2004, its phone business topped 15 percent, ahead of every operating system not named Symbian. Since then, it’s steadily declined. That Microsoft’s phone business was dying has been evident for ages; publications like Wired wrote off Windows Mobile (now just Windows 10 for phones) way back in 2009. Phones like Microsoft’s own Lumia 950 aren’t even sold on Microsoft’s site anymore. In fact, the only Windows phone to appear on Microsoft’s online Store page when you type in “phones that run windows 10” is the Alcatel Idol 4S. HP’s Elite x3, the powerful business phone that runs Windows 10, is now priced £658 (from fave.co/2vBCheA).

Hardware takes a backseat to the cloud

Microsoft’s other hardware doesn’t seem to be struggling nearly as much. The company’s Surface business,

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which has been flirting with a billion-dollar run rate for several quarters, reported \$948 million of revenue during a quarter when customers were waiting for the new Surface Pro and the Surface Laptop. While Xbox revenue dipped, software and services such as Xbox Live Gold propelled it upward by 3 percent, while the new Xbox One X waits in the wings.

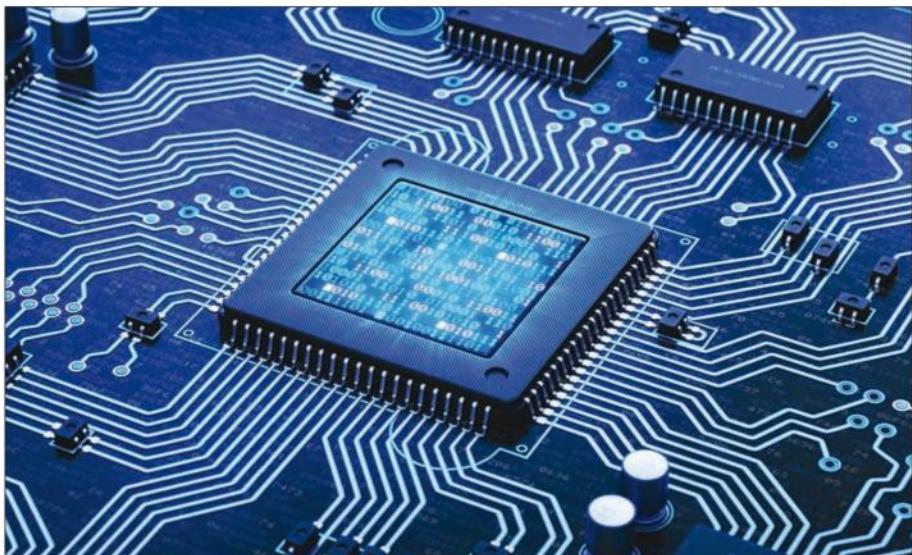
For now, though, Microsoft would prefer to talk about software: about Office commercial revenue, which soared by 43 percent compared to a year ago, evidence that Office 365 is succeeding as businesses can budget for the recurring subscription. Microsoft's Productivity and Business Processes group saw revenue grow by 21 percent to \$8.45 billion, with LinkedIn kicking in \$1.1 billion. Azure is another hot topic, having helped Microsoft's Intelligent Cloud business grow 11 percent to \$7.43 billion. Windows 10, of course, still counts more than 500 million devices, and Windows 10 Pro grew faster than the PC market as a whole.

The Windows phones still clinging to life are not Microsoft's. HP and Alcatel keep on keeping on. Microsoft patches existing features without planning new ones. Meanwhile, the company continues to count Android and iOS phones – 90 million of them, Microsoft said—that use Office on a monthly basis. Our prediction of 18 months ago appears to be coming true.

Supposedly, Microsoft is working on what's known as CShell, an adaptive UI that runs Windows 10 on a variety of screen sizes. Windows 10 on ARM phones may arrive this fall, as well. Maybe that will rekindle interest in mobile devices powered by Windows. For now, though, Windows phones are as good as dead.

Windows 10 may cut off devices with older CPUs

Policy puts all older hardware at risk, writes **MARK HACHMAN**



Credit: iStock

No Windows 10 Creators Update for you, Microsoft says – at least, not if you happen to be the unlucky owner of certain older Atom-based Windows devices, and other aging models in the future. After stories arose of failed attempts to upgrade such hardware to the Creators Update, Microsoft confirmed recently that any hardware device that falls out of the manufacturer's support cycle may be ineligible for future Windows 10 updates.

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In the case of the four ‘Clover Trail’ processors (part of the Cloverview platform) that have fallen into Intel’s End of Interactive Support phase, they will be ineligible for the Windows 10 Creators Update, Microsoft confirmed. Instead, they’ll simply be offered the Windows 10 Anniversary Update, plus security updates through January, 2023, the end of the original Windows 8.1 support period.

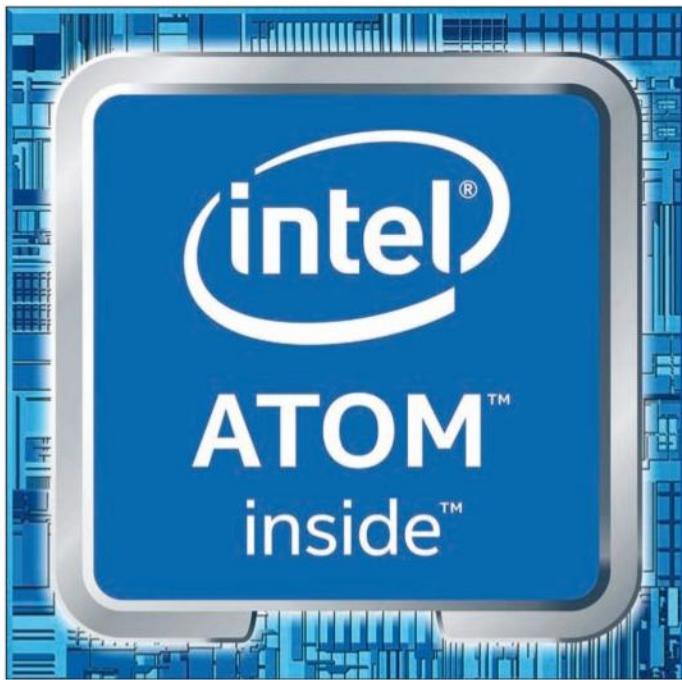
The problem, however, is that Microsoft’s language opens up the possibility that any unsupported hardware device could be excluded from future Windows 10 updates. “Recognizing that a combination of hardware, driver and firmware support is required to have a good Windows 10 experience, we updated our support life cycle policy to align with the hardware support period for a given device,” Microsoft said in a statement. “If a hardware partner stops supporting a given device or one of its key components and stops providing driver updates, firmware updates, or fixes, it may mean that device will not be able to properly run a future Windows 10 feature update.”

For years, the rule of thumb was that you could run virtually any operating system on top of any Intel, AMD (or even Cyrix) hardware. Chances are that it would run, if slowly. Over time, though, things changed. As malware became more potent, running a supported Windows OS became more important. Now, there’s Windows as a Service: if Windows 10 never really goes away, what limits PC builders is supported hardware. Now we have to worry about how long all of our PC hardware components are supported, lest we lose access to upcoming versions of Windows 10.

Is this more than sweeping Atom under the rug?

Microsoft appears to be doubling down on its belief that up-to-date hardware requires an updated operating system, and vice versa. Microsoft said last year that it would restrict the latest Intel Kaby Lake and AMD Ryzen silicon to Windows 10. Recently, the company has blocked patches on PCs that try to run older Windows operating systems on modern hardware.

"As new silicon generations are introduced, they will require the latest Windows platform at that time for support," Microsoft said in January, 2016. "This enables us to focus on deep integration



Credit: Intel

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between Windows and the silicon, while maintaining maximum reliability and compatibility with previous generations of platform and silicon.”

Microsoft’s Clover Trail stance sets limits on what those previous generations can expect. If a processor platform falls out of support by a chip vendor, Microsoft may drop it from its operating system list.

What’s unclear, though, is whether Microsoft’s new position represents a fundamental shift in policy, or a rather narrow focus on Intel’s troubled Atom processors. At one time, Atom’s ‘Clover Trail’ architecture represented the future of Intel processors within the smartphone and tablet markets. But Intel never could quite develop the system-on-chip with logic and communications that rivals like ARM provided, and Intel essentially killed the Atom platform in 2016. Without a healthy customer base to support, Intel apparently decided to refocus its support resources away from the Clover Trail architecture.

Devices that use Intel’s Clover Trail chips “require additional hardware support to provide the best possible experience when updating to the latest Windows 10 feature update, the Windows 10 Creators Update,” Microsoft said in a statement. “However, these systems are no longer supported by Intel... and without the necessary driver support, they may be incapable of moving to the Windows 10 Creators Update without a potential performance impact.”

Specifically, the Clover Trail chips have moved into the ‘End of Interactive Support’, (EOIS), which is defined as “Intel Customer Support Agents no longer respond to telephone, chat, community support forums, or email

inquiries for this product.” Self-help is provided by Intel’s support community, generally made up of other users.

What’s worrying about Microsoft’s statement, though, is its broadness. Conceivably, any ‘device’ – microprocessor, hard drive, network controller, sound card, headphones, monitor, and more – that a manufacturer discontinues or fails to actively support could drop out of Windows updates. While this would certainly encourage new PC and hardware purchases, it would also infuriate millions of PC users whose otherwise-functional legacy devices fell by the wayside.

A related question is whether Microsoft will refuse to support any other Intel processors that have reached EOIS status. Intel has published an enormous list of legacy Core processors on its site (tinyurl.com/y9n86pcc), which includes dozens if not

Legacy Intel® Core™ Processors									
Product Name	Status	Launch Date	# of Cores	Max Turbo Frequency	Processor Base Frequency	Cache	Processor Graphics 1	Recommended Customer Price	Compare
Intel® Core™ i7-2600K Processor Extreme Edition	Launched	Q411	4	3.70 GHz	2.70 GHz	8 MB SmartCache	Intel® HD Graphics 3000	N/A	<input type="checkbox"/>
Intel® Core™ i7-2600K Processor Extreme Edition	Launched	Q111	4	3.50 GHz	2.50 GHz	8 MB SmartCache	Intel® HD Graphics 3000	N/A	<input type="checkbox"/>
Intel® Core™ i7-2600 Processor Extreme Edition	End of Interactive Support	Q111	6	3.73 GHz	3.46 GHz	12 MB SmartCache		\$1058.00	<input type="checkbox"/>
Intel® Core™ i7-2600 Processor Extreme Edition	End of Interactive Support	Q110	6	3.60 GHz	3.33 GHz	12 MB SmartCache		\$1059.00	<input type="checkbox"/>
Intel® Core™ i7-2675K Processor Extreme Edition	End of Interactive Support	Q209	4	3.60 GHz	3.33 GHz	8 MB SmartCache		\$1058.00	<input type="checkbox"/>
Intel® Core™ i7-2695K Processor Extreme Edition	End of Interactive Support	Q408	4	3.44 GHz	3.20 GHz	8 MB SmartCache		\$990.00	<input type="checkbox"/>
Intel® Core™ i7-2640K Processor Extreme Edition	End of Interactive Support	Q210	4	3.33 GHz	2.13 GHz	8 MB SmartCache		N/A	<input type="checkbox"/>
Intel® Core™ i7-2620K Processor Extreme Edition	End of Interactive Support	Q208	4	3.20 GHz	2.00 GHz	8 MB SmartCache		N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor X9100	End of Interactive Support	Q108	2	3.00 GHz	8 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor X9000	End of Interactive Support	Q108	2	2.80 GHz	8 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor X7900	End of Interactive Support	Q207	2	2.80 GHz	4 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor X7800	End of Interactive Support	Q207	2	2.60 GHz	4 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor X5800	End of Interactive Support	Q306	2	2.83 GHz	4 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor Q40770	End of Interactive Support	Q208	4	3.20 GHz	12 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor Q40770	End of Interactive Support	Q108	4	3.20 GHz	12 MB L2			N/A	<input type="checkbox"/>
Intel® Core™ i7 Extreme Processor X20800	End of Interactive Support	Q407	4	3.00 GHz	12 MB L2			N/A	<input type="checkbox"/>

Credit: IDG

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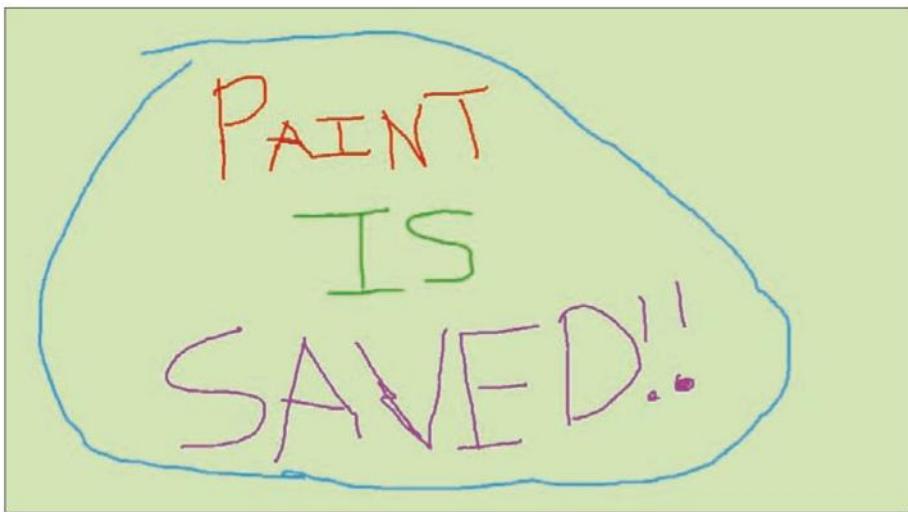
hundreds of chips that have already fallen into the EOIS bin. The most recent EOIS chip appears to be the Core i7-990X, a 32nm Gulftown processor most recently sold during the first quarter of 2011. But chips including the Ivy Bridge (2012) architecture are already at end-of-life status, and presumably headed for EOIS status next. It's not clear whether moving a chip to an EOIS status is decided on a chip-per-chip basis, or if there's a fixed timeline by which chips move from officially supported to end-of-life, and then to EOIS status.

Intel representatives declined to comment on whether other chips beyond the four Clover Trail processors were affected.

If there's an upside, it's that Microsoft said it will actively work with chip vendors to find support for older hardware. "We know issues like this exist and we actively work to identify the best support path for older hardware," Microsoft's statement added.

Microsoft to make Paint a downloadable app

Paint and Paint 3D to live on. **MARK HACHMAN** reports



Credit: IDG

Stand down, everyone: Microsoft Paint isn't going away after all. Microsoft signalled an about-face in a blog post by Megan Saunders, a general manager within the Windows Experiences group. Instead of deprecating Paint in Windows 10 (which seemed to many to be the first step toward oblivion), she said Microsoft would release MS Paint in the Windows Store as a free app. "MS Paint is here to stay, it will just have a new home soon, in the Windows Store where it will be available for free," Saunders wrote.

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Saunders acknowledged the pleas of Paint fans who didn't want this longtime app to go away. "Today, we've seen an incredible outpouring of support and nostalgia around MS Paint," Saunders wrote. Her next words were almost sentimental, as she affirmed Paint's continuing existence: "If there's anything we learned, it's that after 32 years, MS Paint has a lot of fans. It's been amazing to see so much love for our trusty old app."

Microsoft had previously classified the Paint app as 'deprecated' within the upcoming Windows 10 Fall Creators Update, meaning Microsoft would officially cease development on it, and it could be removed from the OS either with the release of the FCU or in the future. Microsoft apparently still plans to remove it – yet allow users access to it if they so choose.

She didn't say when Paint would be transitioned over to a Store app, nor did she mention whether it would still be developed – or just preserved in amber. Saunders did say that Paint 3D, Microsoft's new 3D content creation app, will remain and receive updates in the future.

Paint was born with Windows 1.0 in 1985, as a licensed version of ZSoft's PC Paintbrush. Microsoft updated Paint over subsequent versions, adding support for JPEG, TIFF, and other file formats. Though far more sophisticated imaging tools have risen around it, Paint always served as a quick-and-easy photo editor and drawing tool.

Microsoft building new and improved HoloLens

HoloLens can already see objects, but machine learning could help it identify and interact with them, writes **MARK HACHMAN**



Credit: Microsoft

Microsoft's HoloLens may have largely faded from public view, but that doesn't mean that Microsoft's halted development on it. The tech giant's researchers recently disclosed that HoloLens development is moving ahead, with a new chip that emphasizes machine learning.

Specifically, Microsoft said the next generation of its Holographic Processing Unit, or HPU, will support Deep Neural Network processing, with an emphasis on artificial intelligence, or AI. The AI in question

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isn't necessarily Cortana, but simply the way that the HoloLens recognizes the real world.

Harry Shum, executive vice president of the Artificial Intelligence and Research Group, recently showed off the second version of the HPU. The chip, designed by Microsoft, will be totally programmable, the company said.

Microsoft's HPU is one of the signature features of the HoloLens, responsible for processing all the information coming from the device's sensors, including the movement-tracking sensor, the time-of-flight sensor, the inertial measurement unit, and the infrared camera.

Another key aspect is that it's totally self-contained. Because the HoloLens is untethered, it can't depend on a PC for its processing power. The HPU is its brains.

What this new HPU will actually recognize is not quite clear. Microsoft's current HPU – and by extension, HoloLens – does a nice job of recognizing surfaces and edges and projecting virtual objects on top of them. Whether Microsoft can begin to interpret what those real-world objects are remains to be seen.

We still don't know whether HoloLens ever make it into the mass market, or remain a sort of semi-shadowy tech for specialized businesses. Microsoft hasn't said when the next-generation HPU will ship, nor whether entirely new HoloLens will be built around it. What does seem to be happening, though, is that companies are beginning to rethink augmented reality. Google basically buried Google Glass for several years, then recently resurfaced it as a business tool – the same market Microsoft originally targeted with the HoloLens, incidentally.

Gigabyte Aero 15

£1,899 inc VAT from fave.co/2gXJIPc



Credit: Gigabyte

Gigabyte's Aero 15 is a powerhouse laptop that hits a lot of high notes. Quad-core Intel Core i7-7700HQ CPU? Check. Dual M.2 SSD slots? Check. Up to 32GB of RAM? Check. Nice 15.6in screen? Check. Powerful Nvidia GeForce GTX 1060 GPU? Check.

It's this last point (well, and the garish colours) that will have many calling the Aero 15 a gaming-laptop rather than what it really is: a powerful, portable laptop that can do it all, and with decent battery life to boot. Even the weight's bearable at 2.1kg. We have some objections to its design, but it's still well worth a look.

A splash of colour in a brushed-metal world

The Gigabyte Aero 15 comes in three colours: a standard low-profile black, Hemi Orange and Lime Green. I have to say, the intense hues are refreshing amid a sea of brushed-metal and black shells.

The Aero 15's lid and bottom panel are aluminium, as well as portions of the frame around the keyboard. We're disappointed that the keyboard tray is plastic, but this no doubt shaved off a bit of cost.

The 15.6in, 1920x1080 screen has many pluses and a few minuses. Instead of the more common IPS or TN technology it uses MVA, which has a reputation for slower response times and issues with colour accuracy. We've seen bad examples and good examples of MVA, and the Aero 15's is in the good pile, with wide viewing angles and factory calibration to Pantone X-rite colour standards (at 100 percent brightness). Off-axis viewing is also quite good. The biggest drawback we found is the 285-nit maximum brightness, which is on the lower end of average for a laptop.

Like Dell's XPS 15, Gigabyte's Aero 15 employs a near bezel-less display design.

This helps make the laptop fairly compact, but it also forces the built-in webcam to peer upward at you from the bottom of the screen.

Gigabyte centres the camera, but



Credit: Gigabyte

expect your video-conferencing colleagues to get good look at your double chin.

Keyboard and trackpad

With the keyboard and trackpad, we have another mix of good and bad news. Let's get the bad news out of the way first: the Aero 15's ongoing problems with extended keyboard combinations. When we first tested our Aero 15 unit, it had problems recognizing certain key combinations, such as simultaneous use of Ctrl-Shift-C. Since the Aero 15 shipped, Gigabyte has released at least three firmware updates for the keyboard. Some problems have cleared up, but users are still finding combinations that don't work right.

Gigabyte said it is continuing to work on the problem and is encouraging frustrated users to contact its support line. Is that enough to make you comfortable buying the Aero 15? That's something only you can answer.

The keyboard itself is pretty good. What we especially appreciate is the per-key lighting, which is almost as good as what you'll find in Razer's Blade laptops. It's far brighter than most keyboards we've seen and simply dazzling at night. The software to program the colours works well enough, and there's a good selection of preprogrammed patterns. You can also bind macros to every single key on the keyboard.

An apparent bonus introduces some compromise. Gigabyte added a 10-key numeric pad on the right-hand side of the keyboard. Because of how the cursor keys were squeezed in next to it, however, the numeric pad's '0' was reduced from being a double-wide key under the '1' and '2' (the traditional design) to being a single

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key under the '2'. Those who use a 10-key constantly won't appreciate how this small change will mess with their muscle memory. Gigabyte laptop designers, if you notice your expense reports take longer than usual to process, this is the reason why.

Even if you don't use the 10-key pad, it will mess with you anyway because it shifts a few other things to the left. The trackpad, made by Elan, with a glass layer that feels near-frictionless, is uncomfortably shifted from the expected centre to the left. Left-leaning, too, are the keyboard's home keys. If these change threaten to throw off your productivity, look elsewhere.



The per-key lighting on the Aero 15 is bright in an office setting and dazzling at night

Credit: Gigabyte

We have two more complaints. The first is an odd harmonic, almost Kazoo-like sound that occurs not when the GPU's fan is working hardest, but when it slows down one notch. We're also not fans of the lid angle Gigabyte has chosen for triggering the laptop to go to sleep. On most laptops, you can tilt the screen to within 10- to 15 percent of closing before this happens. On the Aero 15, it goes to sleep when the lid's as high as 45 degrees, which is too soon.

Ports

Where Gigabyte makes up for all that is in the massive number of ports. The right side features an SD card reader, Thunderbolt 3, and two USB 3.1 Gen 1 Type A (5GB/s). And yes, that Thunderbolt 3 port operates at the full x4 PCIe speed (Yes, we're looking at you, XPS 15, with your x2 Thunderbolt 3 port). The right side of the Aero 15 gives you a combo analogue audio jack, miniDisplayPort 1.3, HDMI 2.0, another USB 3.1 Gen 1 Type A, and a Gigabit ethernet port running off of Realtek silicon. All told, Gigabyte says the Aero 15 can run three external monitors on the ports it has.

What's inside

You know the laptop here has a Core i7-7700HQ, 16GB of DDR4/2400 (in single-channel mode), and GeForce GTX 1060 with 6GB of RAM. For storage, Gigabyte shipped our unit with a Lite-On 512GB M.2 drive operating in SATA mode. This is likely for cost, but Gigabyte says the unit will run not just one, but two M.2 drives in PCIe mode. Overall, this is a nice storage combination, as it allows you to run two drives. Dell's

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XPS 15 has the physical space to run a hard drive plus an M.2 drive, but when its larger battery option is selected, there's no room for the hard drive. Asus' new ROG GX501 also has room for only one M.2 drive.

Performance

If you want to browse the web and run Office, a dual-core with integrated graphics is more than enough. People generally buy 15.6in laptops for the power, so here's how the Aero stacks up against the competition.

Cinebench R15

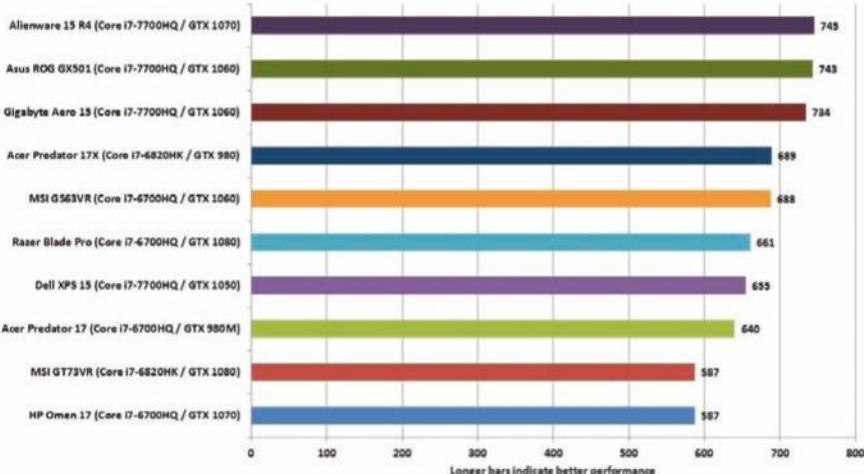
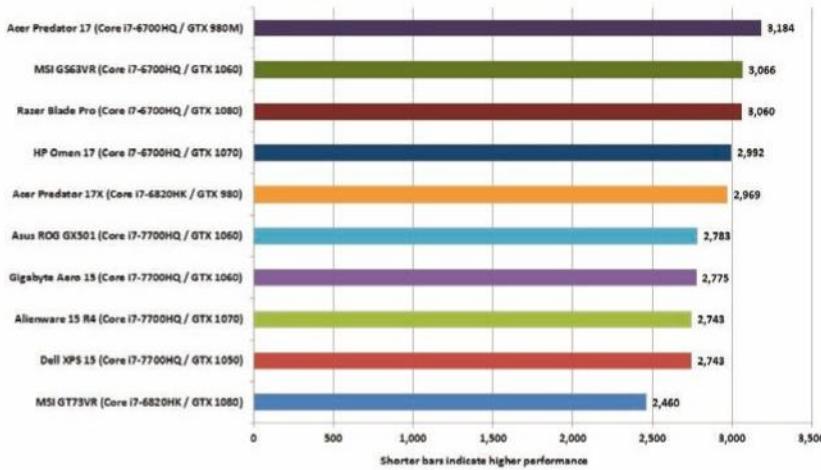
Our first test is Maxon's Cinebench R15, which measures performance while rendering a 3D image. This test is almost pure CPU and gives you a good idea of how well a laptop will perform under multithreaded tasks. For the most part, it's a dead-on tie with the Kaby Lake laptops. The only outlier is the Dell XPS 15, which turns in an oddly slower result. With multiple runs and the latest BIOS, the XPS 15's score was just off.

Handbrake

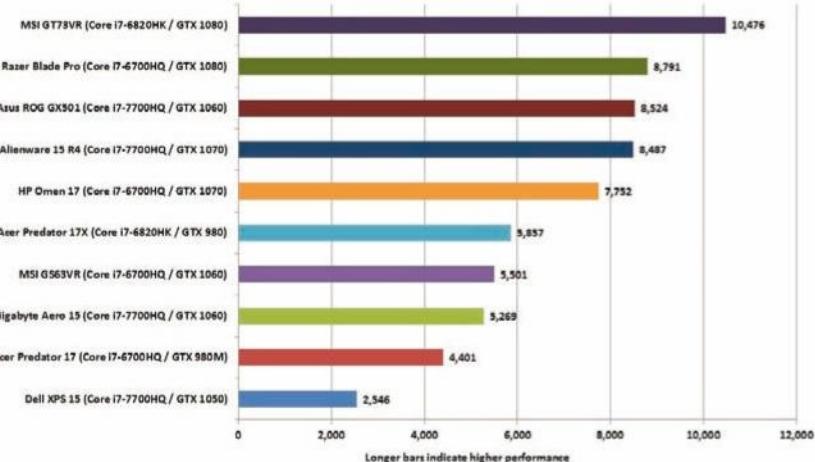
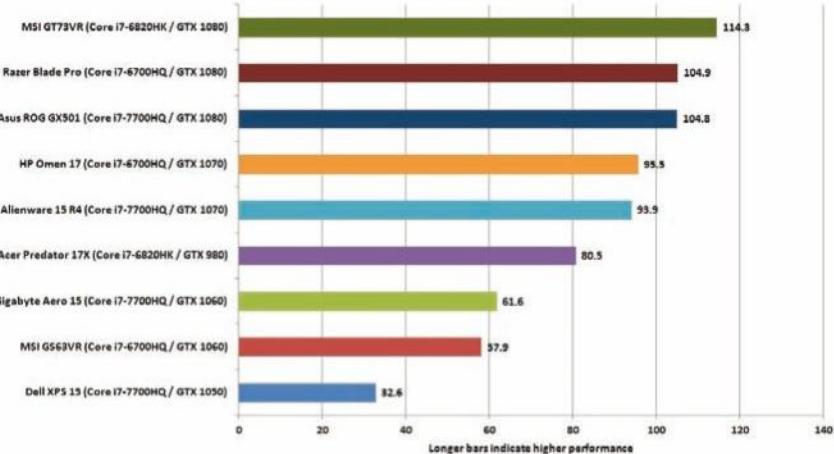
Our next test uses the Handbrake encoder to convert a 1080p 30GB MKV file using the built-in Android Tablet preset. It's mostly a tie here among the Aero 15, the Dell XPS 15, the ROG GX501 and the Alienware 15 R4. The MSI's score for this particular test was likely taken with the laptop in its overclocked mode.

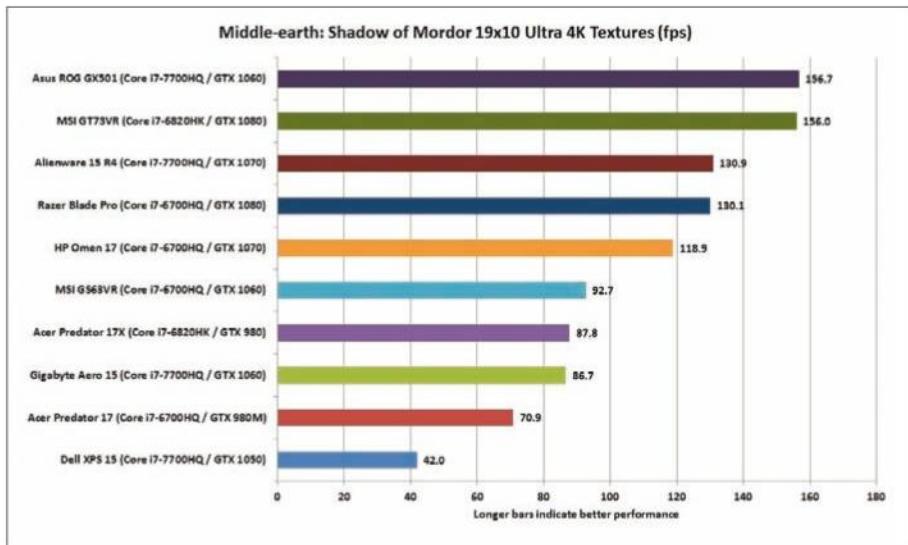
3DMark Fire Strike Extreme

Enough about the CPU. You came here for the GPU performance, so first up is 3DMark Fire Strike Extreme

Cinebench R15 Multi-threaded Performance**Handbrake 0.9.9 1080p Encode (sec)**

REVIEW

3DMark FireStrike Extreme 1.1 Graphics**Rise of the Tomb Raider 19x10 Very High (fps)**



graphics performance. This older Futuremark test is pretty much a pure graphics gauntlet. Although synthetic, it's still an accurate measurement of graphics performance. The Aero 15 is pretty much tied with the other GTX 1060 laptop. Both GTX 1060 laptops represent very well against the older GTX 980 and GTX 980M, too.

Rise of the Tomb Raider

In actual gaming performance, we ran Rise of the Tomb Raider on the Very High setting at 1920x1080. This game is particularly punishing, and the GeForce GTX 1060 6GB cards can push a comfortable 60fps. But glance at the chart and you can see faster – and pricier – GPUs do indeed pay dividends in performance. It's also clear that although the GTX

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1060 can match a GTX 980, it won't do that all the time, as the older Predator 17 X leaves both GTX 1060 laptops in the dust.

Middle-earth: Shadow of Mordor Performance

The last game we ran is Middle-earth: Shadow of Mordor at 1920x1080 resolution on the Ultra setting and with the 4K texture pack loaded. In this game, the GTX 1060 in the Aero 15 matches the GTX 980 in the Acer



Credit: Gigabyte

Predator 17 X, but both are outclassed by the GTX 1070- and GTX 1080-equipped laptops by a healthy margin. Just remember though: The Aero 15 is a comparatively lightweight 2.1kg.

Video playback and battery life

On large gaming laptops, we've typically ignored battery life because they live most of their lives plugged into AC and typically operate more as semi-portable gaming desktops than laptops. But gaming-capable laptops have truly evolved in the last few years and people are starting to expect longer battery life when they're not gaming. (When gaming on any real gaming laptop, you can basically expect an hour of battery if you're lucky.)

To measure battery life for low-impact use, we play a 4K movie using Windows 10's Movies & TV player at an office-bright 250 to 260 nits. This is an area where the Aero 15 truly excels, giving us nearly seven hours of video playback. The only real competitors here, the Dell XPS 15 and the Asus ROG GX501, are a disadvantage: the Dell features a 4K touch screen, which is likely more power hungry than the Aero 15's FHD panel. The ROG GX501 features a fairly tiny battery that's almost half the size of the Aero 15's. The only other comparable laptop here is the older MSI GS63VR, which also has a 4K panel, plus a slightly undersized 65Wh battery. The upshot is a pretty big win for a laptop that has real gaming chops.

Verdict

The Gigabyte Aero 15 is a ground-breaking laptop that manages to have it all – great CPU, great GPU,

great battery life – in a truly portable package. It's a combination that no other laptop maker has achieved until now. The biggest flaws seem to emanate from its keyboard: its struggles with key combinations, let alone the rejigging of some oft-used buttons and the trackpad. Still, we're extremely impressed by the Aero 15, which is almost – almost – the ultimate power user's laptop. **Gordon Mah Ung**

Specifications

- 15.6in (3840x2160) wide viewing angle anti-glare display LCD
- Windows 10
- 7th generation Intel Core i7-7700HQ (2.8- to 3.8GHz)
- Nvidia GeForce GTX 1060 GDDR5 6GB
- 8GB/16GB DDR4 2400 2 slots (Max 32GB)
- Gigabyte Fusion RGB Per-Key Backlit Keyboard
- 2x USB 3.0 (Type-A)
- 1x Thunderbolt 3
- 1x USB Type-C
- 1x HDMI 2.0, 1x mini DisplayPort
- Headphone-out jack (Audio-in Combo)
- SD Card Reader
- 2W speaker
- Microphone
- Wi-Fi 802.11ac
- Bluetooth 4.2
- HD Camera
- Kensington Lock
- 94.24Wh lithium polymer battery
- 356.4x250x19.9mm
- 2.1kg

Best Windows laptops

GORDON MAH UNG, MELISSA RIOFRIO and ALAINA YEE's top picks feature the best tech advances in portable PCs



Credit: iStock

Choosing the best laptop can be difficult these days. With companies like Dell, HP, Acer, and Asus continually launching updates of popular notebooks and expansions of product lines, we're all but swimming in options right now.

Summer has pushed even more convertibles, 2-in-1s, and traditional notebooks onto store shelves. The most interesting ones poke holes in existing assumptions about certain categories. Microsoft's Surface Laptop, for example, is an attempt to revive the company's battle

ROUND-UP

with Chromebooks, while Dell's Inspiron 15 7000 Gaming – our 'Best budget gaming laptop' pick – offers 1080p gaming for just £899. Vendors also are serious about squeezing AMD's new CPUs into their line-ups, with Asus recently debuting the first Ryzen laptop at Computex.

Best ultrabook laptop

Winner: Dell XPS 13

Price: £1,149 from fave.co/2h50xTh

Dell might be sticking to the adage of 'If it ain't broke, don't fix it' when it comes to the XPS 13 (pictured), but that strategy keeps producing the best ultrabook of the bunch. The Kaby Lake XPS 13 shares the same design as its predecessors: a quality aluminium exterior and carbon fibre top, and that wonderfully compact, bezel-free 13in screen.



Credit: Dell

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The firm actually released two updates to the XPS 13 in 2016: the one at the start of the year swapped in a Skylake CPU, added a USB Type-C port that served as an alternative charging port, and offered upgraded storage options. The most recent refresh – and our new pick for Best Ultrabook – keeps the same chassis changes as the Skylake XPS 13, features a jump to Intel's new Kaby Lake processor, and sports a slightly larger battery. You get improved performance across the board, with a nice bump of an extra half-hour of battery life during video playback.

Our only lingering complaint is the small keyboard, but overall, you can't lose with the newest XPS 13. It's a truly compact ultrabook that punches out of its class.

Runner-up: HP Spectre Laptop

Price: £1,249 from tinyurl.com/y84dnxd2

If looks are more your thing, the HP Spectre Laptop certainly has a distinct profile: It's one of the thinnest ultrabooks around. For anyone coveting the streamlined experience of Apple's 12in MacBook, this 13in notebook will bring you close while providing superior performance.

You might expect such a skinny laptop to sport a lower-wattage Core i3 or i5 processor, but HP fits a 15 watt Core i5 or i7 processor into this Spectre. That puts it on par with other, chunkier top-tier ultrabooks, like the XPS 13. Combined with its 256GB M.2 SSD, it runs smoothly and swiftly during typical office drone work (word processing, spreadsheet editing, web browsing, and so on), without any heavy throttling of performance during CPU-intensive tasks. HP also made the ports

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count: While there are just a few, you get not one but two Thunderbolt 3 ports, as well as a USB-C port.

The drawbacks of this modern and sleek notebook are its battery life, which is modest due to its smaller battery, and its wider frame. (The Spectre 13.3's hardware and cooling configuration requires a certain amount of space – HP's engineering is impressive but can't defy the laws of physics.) It's for those reasons that we prefer the XPS 13, but this laptop is still a very fine companion.

Best convertible laptop

Winner: HP Spectre x360

Price: £12,499 from fave.co/2vM2UgY

We liked the first Spectre x360 when it launched back in 2015, but that 2-in-1 laptop had a few flaws. The updated version, which released in October 2016, blew away its predecessor by being smaller, thinner, and noticeably lighter, while still providing excellent performance and battery life. Now there's a 2017 edition that adds active pen support and the option of a 4K screen to the 2016's already-excellent package.

Inside our review model was a Kaby Lake Core i7 processor that kept pace with a quad-core Skylake CPU during tasks like word processing and spreadsheet editing, and handled games like Minecraft and League of Legends at low-resolution and low-quality image settings. If you opt for a FHD (1920x1080) screen, the battery will last almost 11 hours during continual video playback, and just over seven if you go for the beautiful 4K (3840x2160) display. Active pen support rounds out the experience – it's easy to jot clear notes and sketch clean diagrams with the included pen accessory.



Credit: HP

This laptop is so good, it gives our top pick for Best Ultrabook a run for its money. If it weren't for the wide-aspect ratio trackpad, the low number of ports (just three total, and you lose one to charging whenever it's time to top up), and a couple of slight performance dips on the 4K version, it might have won. For now, though, it can rule this convertible category until it's time to challenge the Dell XPS 13 yet again.

Best budget convertible laptop

Winner: Asus ZenBook Flip

Price: £799 from tinyurl.com/yaxn8q5n

For years, Asus has offered great value in its notebooks, and the ZenBook Flip is a strong example of its affordable, high-performing offerings. For £799, you get

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Credit: Asus

a fully convertible notebook that can handle everyday tasks with ease.

In fact, its pricing and specs are similar to our favourite budget ultrabook, the Asus UX305 (now discontinued). Inside you get a Core m3-6Y30, 8GB of RAM, and a 256GB SSD, and outside there's a 1920x1080 IPS screen with an anti-glare finish.

Yet despite the modest CPU, the Asus ZenBook Flip is fairly peppy. In our benchmarks, it actually outperformed faster (and newer) Core m5 and m7 processors in rival machines during short CPU-intensive tasks. Its storage drive is no slouch, either.

This laptop is slender and lightweight, too. It measures 56mm thick and 1.3kg, which keeps it in line with more expensive ultraportables. You're not

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saddled with chunkier dimensions or extra weight in exchange for a lower price.

A couple of compromises do exist: There's no backlighting on the keyboard, and the trackpad is a tad springy. Still, it's a good deal in a price range that usually nets you thick, ugly, and plastic.

Best hybrid laptop

Winner: Microsoft Surface Pro 4

Price: £749 from fave.co/2vLkRfr

That a Surface Pro laptop is the winner of this category shouldn't come as a surprise. After all, Microsoft gave legs to the concept of hybrid tablet/laptop devices (also known as '2-in-1' laptops) – the Surface series is really an evolutionary step beyond the typical 'convertible' devices that physically separate from the keyboard to run independently as tablets.

What may be surprising is that our best pick remains the Surface Pro 4, even given the launch of the Surface Pro (£2,149 inc VAT from fave.co/2tMPosC). (This Apple-style of naming hides the fact that the new Surface tablet is akin to a Surface Pro 5.) However, given the Surface Pro's performance throttling and higher price tag, we think the Surface Pro 4 offers the better mix of value and performance while it's still available.

Sure, Surface clones have arisen that are also light yet still very capable, like Lenovo's Miix 700 (£799 from fave.co/2h5aSOL). But we like this hybrid tablet better than its cheaper rivals for its top-rated display, great performance, and the fact that its keyboard and trackpad are miles ahead of competing designs.

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Credit: Microsoft

The only caveat: It's expensive – and the essential keyboard adds £124 to the price (available from fave.co/2h5s2vK). (No, it's not included.) That means the midrange Surface Pro 4 with 256GB of storage, 8GB of RAM, and a Core i5 is a £1,099 computer. Hopefully, prices will get cut now the new Surface Pro has arrived.

In any case, if you value portability – it really is laptop performance in a tablet – and will actually use it as a tablet on occasion, you'd be hard-pressed to beat the Surface Pro 4 right now.

Runner-up: Samsung Galaxy Book

Price: £649 from fave.co/2vM8Pmm

Samsung's follow-up to its first 2-in-1 doesn't take any extreme turns off the established path. It's still incredibly thin and lightweight, and it offers an even more stunning AMOLED screen that supports HDR.

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But it's still not quite our favourite convertible, and that's partially due to Samsung's decision to sell both a small and a big version of the Galaxy Book. The more affordable, lower-power Core m3 model has a smaller 10.6in screen (£649 from fave.co/2vM8Pmm). If you want a 12in screen, you'll have to jump to a starting price of £1,099 from fave.co/2vM8Pmm.

Despite these two tougher choices, the Galaxy Book is still compelling. It offers solid performance (including over 10 hours of video playback on the 12in Core i5 model) and addresses some of our complaints with the Galaxy Tab Pro S (£699 from tinyurl.com/y9wL6mw5). You now get two USB-C ports, and the keyboard secures tightly to the tablet. And of course, it has that gorgeous display. So while it may no longer have a huge advantage in price, Samsung still manages to hold its own with a few compelling features. Particularly the included pen – Microsoft's equivalent accessory is an optional purchase (£99 from fave.co/2vLMI4U).

Best gaming laptop

Winner: MSI GT73VR Titan

Price: £2,599 from fave.co/2vLO21W

The arrival of Nvidia's Pascal-based mobile GPUs has transformed high-end gaming laptops – for the first time, they're able to give desktops a run for their money. Case in point is MSI's GT73VR Titan, which pairs a GTX 1080 mobile GPU with a 17.3in, 1920x1080, 120Hz G-Sync panel. It delivers crazy-smooth, high frame-rate gaming at an unprecedented level: We saw frame rates over 150fps with everything maxed out in our Tomb Raider and Middle-earth: Shadow of Mordor benchmarks.

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Other GTX 1080 options exist, but none come as loaded with benchmark-topping technology and run as quietly. Origin's similarly configured EON17-X, for example, blasts like a jet engine, but provides only a very small gain in performance.

This Titan does have a couple of potential drawbacks – the trackpad's buttons, for example, are incredibly stiff and require a lot of force to click, but overall, the GT73VR is a great gaming notebook that has what it takes to dominate its class.

Best budget gaming laptop

Winner: Dell Inspiron 7000

Price: £899 from fave.co/2vLshiN

Not long ago, playing a game at higher-resolutions and higher graphics settings on a laptop meant shelling out.

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Credit: Dell

That's changed in the past year. For under £1,000, you can get a gaming laptop that will play at 1080p and offers a quad-core i5-7300HQ, 8GB RAM, and an Nvidia GeForce GTX 1050 Ti in its £899 base configuration.

It's a lot of muscle for the price. This system can handle today's games on High at 1080p (in Rise of the Tomb Raider, this Inspiron ran at over 50fps), and it can definitely play popular titles like League of Legends, Dota 2, Rocket League, Team Fortress 2, and Overwatch.

There is one catch, however. The launch version of the Inspiron 15 7000 Gaming has a terrible TN panel with extremely bad viewing angles and washed-out colours. If you plan to game using an external monitor or can handle a less-than-stellar screen, though, this is a heck of a machine for the price.

Best portable gaming laptop

Winner: Alienware 13

Price: £1,249 from fave.co/2vMiGbG

Nvidia's Pascal GPUs haven't just put the traditional beefy gaming laptops on a par with desktop machines. They've also made the term 'portable gaming laptop' no longer an oxymoron. Put a GTX 1060 into a laptop

ROUND-UP

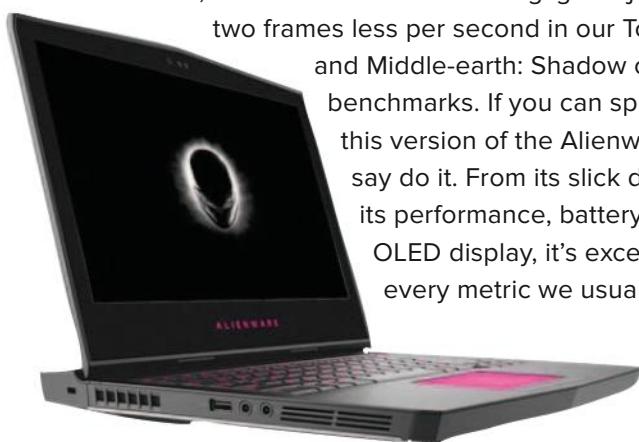
and you have a capable machine that can survive away from a wall socket – and won't break your back while carrying it, either.

Now, at 2.6kg, the Alienware 13 is a little heavy for its size, but it's worth toting around. The model we reviewed packed a gorgeous OLED 2560x1440 display, a quad-core i7 processor, and a VR-capable Nvidia GTX 1060 for flawless 1080p gaming.

Its extra weight comes from its incredibly sturdy and solid chassis, built to withstand hot climates and gamers who react physically to the highs and lows of gameplay. If you're of a more even temperament, and really want to ditch the weight, you can instead opt for our runner-up, the MSI GS63VR, which is a pound lighter and sports a larger display. The MSI model can't compete with the luxury of this Alienware's screen, though: gaming on it makes the best LCD panels seem pixellated and washed out.

While performance is a hair under that of the MSI GS63VR, the difference is almost negligible: just one or two frames less per second in our Tomb Raider

and Middle-earth: Shadow of Mordor benchmarks. If you can splurge on this version of the Alienware 13, we say do it. From its slick design to its performance, battery life, and OLED display, it's exceptional in every metric we usually examine.



Credit: Alienware

Runner up: MSI GS63VR Stealth

Price: £1,999 from tinyurl.com/ybxvk63o

Nvidia's impressive jump in performance between last-generation Maxwell GPUs and this year's Pascal GPUs has truly changed the gaming laptop space. MSI's GS63VR Stealth is the boldest example of this: This portable gaming laptop sports a 15.6in screen, a quad-core i7-6700HQ processor, and a GTX 1060 – all while weighing just 1.8kg. (That's not a typo; we double-checked that number on our office's postal scale.)

You do make some trade-offs to get the weight that low, of course. DIY upgrades are difficult on the GS63VR, and the build quality is less sturdy than that of Alienware's 10-series laptops. Adding to the list of potential negatives are the GS63VR's display, which has muted colours and doesn't get very bright, as well as the weak audio subsystem.

Despite its drawbacks, the MSI GS63VR Stealth is still a 15.6in, four-pound laptop that can play the newest games at 1920x1080 with settings at or near Ultra. It'll allow you to finally have portability and performance at the same time.

Best luxury laptop

Winner: Microsoft Surface Book

Price: £1,849 from fave.co/2vM6Q11

There's no way to describe Microsoft's Surface Book as anything but a luxury item. The configuration you want – the one with the GPU under the keyboard – isn't even available until you fork out £1,849. But what you get is glorious. Start with the beautiful, high-resolution 13.5in screen, a discrete GeForce option, Skylake dual-

ROUND-UP



Credit: Microsoft

core and exceptional battery life. That you can remove the screen to use as a tablet – err, clipboard – with the included pen is just a major bonus.

Performance in general is near the top of the heap, particularly in the Core i7 model that we reviewed. On graphics loads, including video-accelerated encoding, it can't be touched by anything in its class.

Those who can afford it are going to get what they want: a beautiful laptop that will probably start conversations in the first-class cabin as you fly from Dubai to London.

12 free PC utilities

Monitor and manage all aspects of your Windows PC with **MIKE VANHELDER**'s round-up of the best free utilities



Credit: iStock

There are some very good reasons why you might want to peer behind the scenes of your Windows PC. Maybe you want to tweak your system to maximize performance, or maybe you just want to know what your computer is doing underneath those slick desktop graphics. Either way, here are 12 free programs you can use to fully monitor and manage your Windows experience.

ROUND-UP

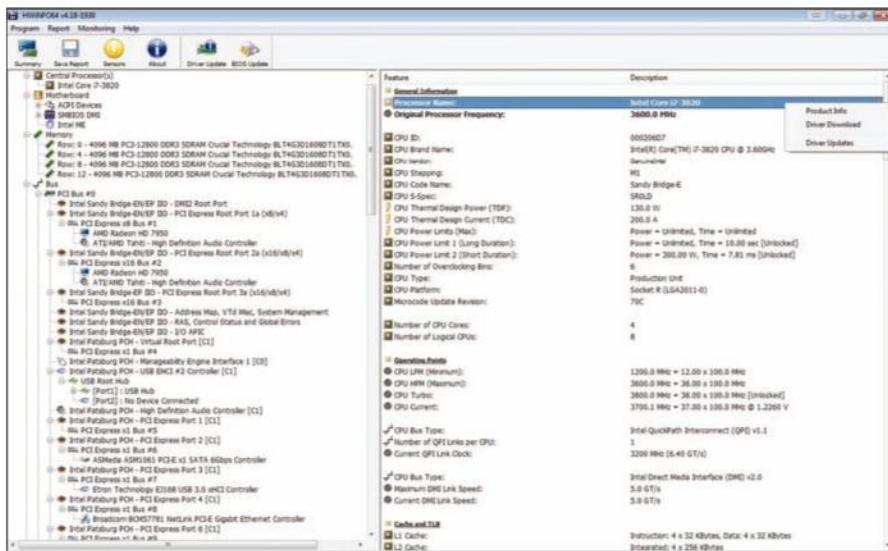
Installed: 10/2/2015 6:17:21 AM Servicing Branch: Current Branch (CB) Boot Mode: UEFI with successful Secure Boot	Ex/Chassis Type: Desktop
Processor * 3.20 gigahertz Intel Core i3-4170T 128 kilobyte primary memory cache 32.0 kilobyte secondary memory cache 3072 kilobyte tertiary memory cache 64-bit ready Multi-core (2 total) Hyper-threaded (4 total)	Main Circuit Board * Board Dell Inc. 0J9H4R A01 Serial Number: [REDACTED] Bus Clock: 100 megahertz UEFI: Alienware A64 07/14/2015
Drives 488.89 Gigabytes Usable Hard Drive Capacity 28.01 Gigabytes Hard Drive Free Space TOSHIBA MQ01ACF050 [Hard drive] (500.11 GB) - drive 0, sn: [REDACTED] rev AV001D. SMART Status: Healthy	Memory Modules 4.6 4042 Megabytes Usable Installed Memory Slot 1 is Empty Slot DIMM2 has 4096 MB (serial number [REDACTED])
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Users (mouse over user name for details) Local user accounts [REDACTED] last logon 3/20/2017 6:22:49 PM (admin) Local system accounts Administrator last logon 7/20/2016 6:29:23 PM (admin) DefaultAccount never (admin) Guest never (admin) * Marks a disabled account. □ Marks a locked account	Display Microsoft Print To PDF Microsoft Shared Fax Driver Microsoft XPS Document Writer v4 Send to Microsoft OneNote 16 Driver
Controllers Intel(R) 8 Series/C220 Chipset Family SATA AHCI Controller	Multimedia NVIDIA High Definition Audio NVIDIA Virtual Audio Device (Wave Extensible) (VDM) Plantronics C310M Realtek High Definition Audio
Bus Adapters Microsoft Storage Spaces Controller Intel(R) 8 Series/C220 Series USB EHCI #1 - 8C26 Intel(R) 8 Series/C220 Series USB EHCI #2 - 8C2D Intel(R) USB 3.0 eXtensible Host Controller - 1 (Microsoft)	Group Policies
Virus Protection [Scan In Task]	

1. Belarc Advisor

It's tough to tweak your hardware and software settings without knowing your exact system composition to begin with. Belarc Advisor (tinyurl.com/y9pryg6b) tells you in detail all about your hardware, software, patch status, security settings, networking inventory, and more. If you're dealing with a new system for the first time, running a Belarc report can give you vital information in one place that it could take hours to collect the old-fashioned way. Save yourself a headache and run Advisor first.

Advisor is aimed at the individual home user, but there are versions of Belarc software that can be used in a larger-scale office setting. If you're an IT professional and you want to come to grips with your new working environment, look no further.

ROUND-UP

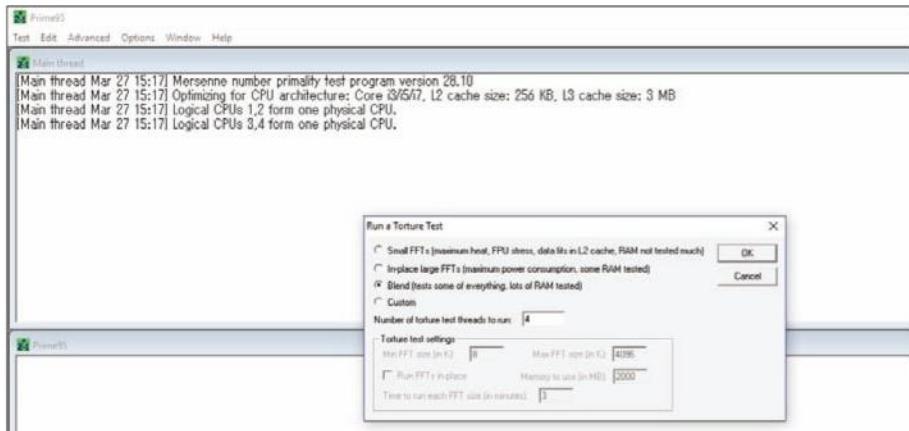


2. HWiINFO

If you need even more information about your hardware than Belarc can provide – maybe because you’re building your own custom overclocked gaming rig or maybe because you’re trying to track down a pesky overheating issue – you can use HWiINFO (tinyurl.com/gtuxvwh). It provides extremely detailed info on your hardware components, as well as real-time tracking of things like temperature and power usage. It’s got a bigger footprint than more specialized tools like CoreTemp (which monitors only processor temperature and power draw) but for maximum utility it can’t be beat.

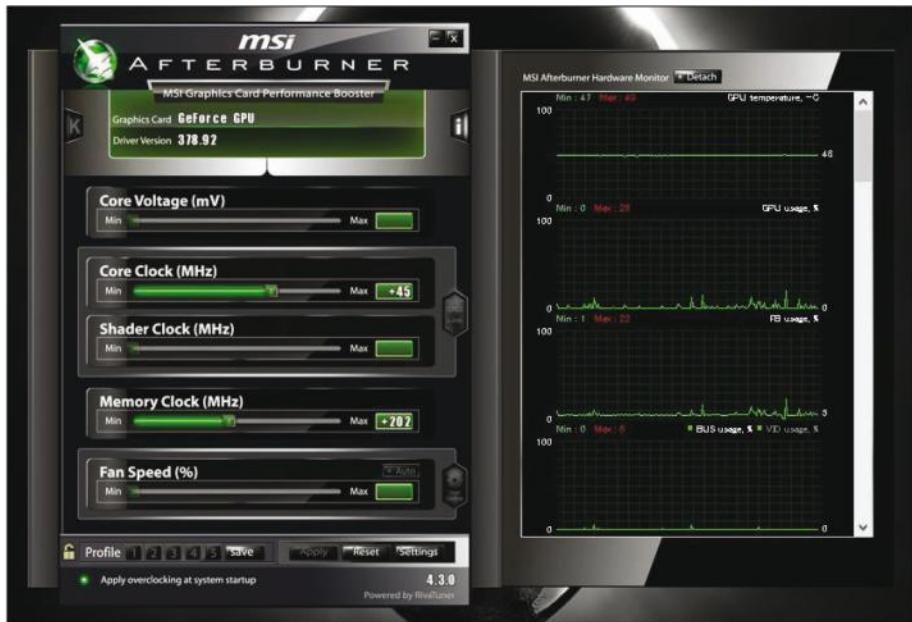
You can also use HWiINFO to generate slick-looking reports that you can post online to show off your rig to other enthusiasts, or just hang on your wall as a trophy.

ROUND-UP

**3. Prime95****4. MemTest 86+**

Okay, so let's say you've run your Belarc report and installed HWInfo. You know what you're working with, but how do you know how your computer will perform under a heavy load? There are dozens of stress-testing utilities out there, but Prime95 (tinyurl.com/zosh94b) and MemTest86+ (tinyurl.com/2zn3t) are two stalwarts. Prime95 uses your processor to calculate extremely large prime numbers, and MemTest86+ taxes your RAM with several different memory-straining algorithms. If you've got a flaw in your setup, these utilities will smoke it out. Hopefully, the smoke in this situation is figurative.

MemTest86+ is especially useful because you can boot to it, so if you suspect a memory problem is making Windows unstable, you can bypass the operating system entirely and test the hardware from the BIOS level.

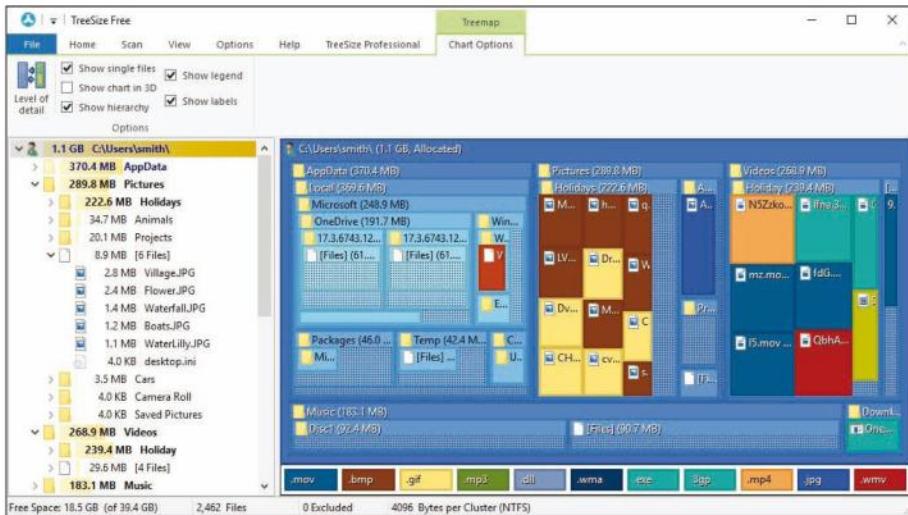


5. MSI Afterburner

Speaking of maximizing performance, MSI Afterburner (tinyurl.com/zkog8s1) has long been one of the most popular graphics-card overclocking and monitoring programs among PC enthusiasts. Do you want to squeeze every last pixel out of your video card, and do it without melting your motherboard? That's what Afterburner is for.

Afterburner is a far cry from the early days of overclocking, when we had to literally solder jumpers on the video card and use aquarium pumps for cooling. Word to the wise: Even with a software solution like Afterburner, it's really easy to damage your system if you get too ambitious with overclocking, so be careful.

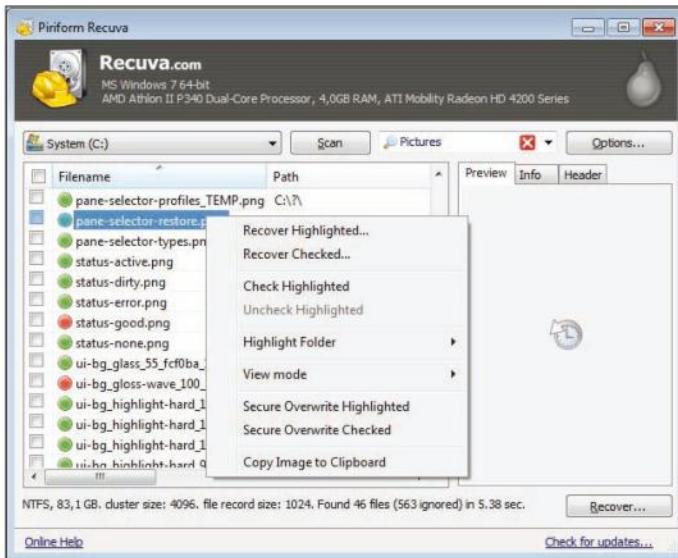
ROUND-UP



6. TreeSize Free

What about maximizing your HDD or SSD storage space? Haven't you always wondered what's taking up all those billions and billions of bytes on your system? TreeSize Free (tinyurl.com/kLe8gpq) can tell you. You can use it to run a scan on all of your drives – internal, external, and network-based – to see what files are taking up space and where they live. This can be especially useful if you suspect you might have out-of-control log files clogging your drive, or if you suspect dead sectors or other drive corruption problems.

Paid versions of TreeSize can be used to perform more advanced hard-drive management tasks including file de-duplication and a variety of snazzy visualizations and reports, but for basic functionality the free version works just fine.



7. Recuva

What if you go too far trying to make room on your drives and delete things that you shouldn't? Recuva can restore deleted material from all kinds of local drives, including USB memory sticks, memory cards, and regular drives. It's not perfect, or guaranteed to work, but if you've accidentally deleted your wedding pictures there's no better free solution if you want to try to get them back.

Recuva (tinyurl.com/c8cn6eo) can also securely delete files and make them almost impossible to recover. Again, nothing is perfect, but short of a military-grade zero-fill solution, Recuva is as close to reliable as you can get.

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The screenshot shows the Autoruns application interface. At the top, there's a menu bar with File, Entry, Options, and Help. Below the menu is a toolbar with icons for Print Monitors, LSA Providers, Network Providers, WMI, Sidebar Gadgets, Office, Codecs, Boot Execute, Image Hijacks, AppInit, KnownDLLs, Winlogon, Winsock Providers, Everything, Logon, Explorer, Internet Explorer, Scheduled Tasks, Services, and Drivers. A filter input field is located above the main list. The main area displays a table of startup entries:

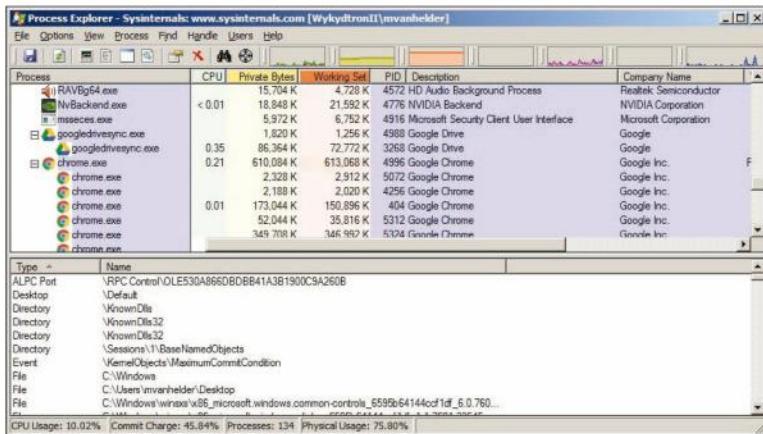
Autorun Entry	Description	Publisher	Image Path	Timestamp	VirusTotal
<input checked="" type="checkbox"/> UACContex... Menu	Shell extension	Panda Security, S.L.	c:\program files\x86\pand...	8/4/2016 11:29 PM	
<input checked="" type="checkbox"/> HKLM\Software\Classes\Directory\ShellEx\ContextMenuHandlers				10/12/2016 9:22 PM	
<input checked="" type="checkbox"/> 7-Zip	7-Zip Shell Extension	Igor Pavlov	c:\program files\7-zip\7-zip...	10/4/2016 10:51 AM	
<input checked="" type="checkbox"/> HKLM\Software\Classes\Directory\ShellEx\DragDropHandlers				10/2/2016 6:02 AM	
<input checked="" type="checkbox"/> 7-Zip	7-Zip Shell Extension	Igor Pavlov	c:\program files\7-zip\7-zip...	10/4/2016 10:51 AM	
<input checked="" type="checkbox"/> HKLM\Software\Classes\Directory\Background\ShellEx\ContextMenuHandlers				10/2/2016 6:02 AM	
<input checked="" type="checkbox"/> NvCplDesktop...	NVIDIA Display Shell Extens...	NVIDIA Corporation	c:\windows\system32\nvs...	3/16/2017 7:10 PM	
<input checked="" type="checkbox"/> UACContex... Menu	Shell extension	Panda Security, S.L.	c:\program files\x86\pand...	8/4/2016 11:29 PM	
<input checked="" type="checkbox"/> HKLM\Software\Classes\Folder\ShellEx\ContextMenuHandlers				10/2/2016 6:02 AM	
<input checked="" type="checkbox"/> 7-Zip	7-Zip Shell Extension	Igor Pavlov	c:\program files\7-zip\7-zip...	10/4/2016 10:51 AM	
<input checked="" type="checkbox"/> UACContex... Menu	Shell extension	Panda Security, S.L.	c:\program files\x86\pand...	8/4/2016 11:29 PM	
<input checked="" type="checkbox"/> HKLM\Software\Microsoft\Windows\CurrentVersion\Explorer\ShellIconOverlayIdentifiers				2/18/2017 5:46 PM	
<input type="checkbox"/> SkuDrive\Print	Miment OneDrive for Business	Miment Corporation	c:\windows\system32\mim...	12/24/2016 9:58 AM	

At the bottom left, it says "(Escape to cancel) Scanning...". At the bottom right, it says "Windows Entries Hidden."

8. Autoruns

A leading cause of system-performance slowdown on a Windows PC are all of those annoying startup programs. Are they even necessary? A lot of the time, the answer is no. The built-in Windows startup-management utilities (MSConfig in Windows 7 and earlier; the Startup tab of the Task Manager in Windows 8 and up) are okay for basic stuff, but to really get into the nitty-gritty you need Autoruns (tinyurl.com/LLuorf).

Autoruns will tell you, down to the individual DLL level, every single thing that loads on top of Windows when you start your computer, and let you decide whether to let it happen. If you suspect you might have a problem with malware that reinstalls itself every time you boot up, Autoruns is a great place to start looking.



9. Process Explorer

10. Process Manager

Okay, now you've got your system hardware running perfectly. Next you want to see what Windows actually does with it. Microsoft's Process Explorer (tinyurl.com/pfqpmj7, aka Procepx) and Process Monitor (tinyurl.com/h3v2eke, aka Procmon) will give you detailed, in-depth information on everything running on your system. Procepx is a turbocharged Task Manager replacement, and Procmon features real-time monitoring of all process operations. It's technical stuff, but if you're a power user and you want to know exactly what's happening, when, and why, there's no real substitute, especially not for free.

In conjunction with Autoruns, you can use Procepx and Procmon to hunt down even really nasty, antivirus-resistant malware. These are the tools that the pros use, and they are an excellent way to learn how Windows works for intermediate and advanced users.

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**11. BitMeter OS****12. Wireshark**

If you want to know how much Internet bandwidth your system is using, either because you're on a metered connection or just because you want to know how long it will take something to upload or download, BitMeter OS (tinyurl.com/y7xm8s7n) gives you real-time bandwidth analysis in a slick, user-friendly package. If an elderly relative asks you why their Internet is so slow, BitMeter's reporting (pictured) can give you something concrete and easy to understand to show them.

If you're looking for something more advanced, download a network protocol monitor like Wireshark. It will tell you about every single piece of data entering and leaving your computer, what it is, and where it's going. Wireshark (tinyurl.com/b4ab9gu) is an indispensable tool for many system administrators and security professionals, but even intermediate users can benefit from the information it provides.

LATEST SMARTPHONES, TABLETS & WEARABLES

ANDROID ADVISOR

ISSUE
40

FROM IDG

BEST ANDROID PHONES

2017



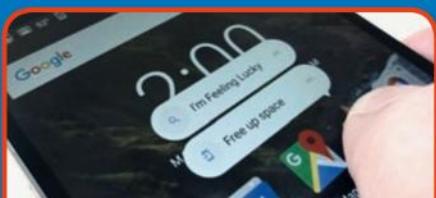
+
OnePlus 5
REVIEWED



**SAVE MONEY
WITH OUR GUIDE TO
DATA ROAMING**



**PLUS COOL ANDROID
FEATURES MISSING
FROM iOS 11**



FEATURE

Transform a laptop into a gaming powerhouse

With an external graphics setup, you can transform your laptop into a gaming powerhouse. **IAN PAUL** shows how



Credit: IDG

My desire to power up a laptop with an external graphics card began in 2015, when I set out on a quest to get back into PC gaming – a beloved pastime I'd neglected since childhood.

But the only PC I had at the time was a 2011 Lenovo ThinkPad X220 laptop with Intel HD 3000 integrated graphics. That just won't cut it for proper PC gaming.

Sure, the laptop would work well enough for older titles like Diablo III, especially on the laptop's tiny 1366x728-resolution display, but forget about more graphics-intensive modern games on an external 1080p monitor. That's why I decided to examine external graphics card (eGPU) setups.

And indeed, I found entire communities of people creating DIY setups that connected desktop graphics cards to their laptops via ExpressCard or mPCIe slots. It isn't hard, either. Many do-it-yourselfers end up with a plug-and-play experience requiring little to no modification, though it takes some research first. When it's done, however, you'll be left with a console-toppling PC gaming setup for about the same price as a new Xbox One S, depending on which graphics card you choose. That's far cheaper than building a whole new gaming desktop, and you can still take advantage of your laptop's portability by disconnecting the eGPU hardware.

But powering up a laptop with desktop graphics has taken major strides forward since 2015.

We'll walk you through the DIY process for configuring an external graphics card later in this article, along with the sudden rise of streaming games from the cloud, but first let's take a look at a major recent development in the world of eGPUs: the widening availability of Thunderbolt 3 on Windows notebooks.

Thunderbolt 3 graphics card docks

Thunderbolt 3 (TB3) is Intel's high-speed external input/output connection, capable of speeds up to a blistering 40 gigabytes per second (GB/s) over a compatible USB-C

FEATURE

port. For resource-intensive activities like gaming, a speedy connection between your laptop and an external graphics card provides a big boost for performance.

Previous attempts at external graphics card docks existed, but they were usually overpriced and relied on proprietary connection technologies. Thunderbolt 3 levels the playing field, and several companies are now building TB3-based graphics card enclosures.

All is not perfect in the world of Thunderbolt 3-powered graphics, however. Enclosures are, for the most part, still a pricey proposition – much more so than the DIY method we'll outline later. You'll also need a relatively new notebook equipped with a Thunderbolt 3-compatible USB-C port. If you're in the market for a new clamshell, some good choices at this writing include the HP Spectre x360 and the new Dell XPS 13.

Plus, Thunderbolt 3 and graphics cards have only recently started to play nicely together thanks to Intel's Thunderbolt 3 external graphics compatibility technology, which PC makers must specifically enable. It's a slightly maddening situation that should improve over time as Thunderbolt 3 matures.

Once you've got your laptop sorted out it's time to look at some enclosures. We can't cover all possible enclosures here, as virtually every major PC graphics card vendor is rolling out a graphics dock of its own, but we'll look at some of the major products introduced in recent months.

Razer Core

The Razer Core (£499 from fave.co/2vFsbtc) was the first major TB3 enclosure to make a splash,



Credit: Razer

ostensibly designed for Razer laptops but able to work with any compatible TB3 system. The Core uses Thunderbolt 3 over a USB-C connection and includes four USB 3.0 ports, ethernet, and a 500W power supply. It'll handle any modern GeForce or Radeon graphics card you throw at it.

The Core is the most expensive TB3 enclosure available right now. When I asked Razer why, the company pointed to some premium features, like support for Razer's programmable Chroma RGB lighting and the ability to charge your laptop and run the graphics card at the same time thanks to the Core's 500W power supply. The Core was also a trailblazing Thunderbolt 3 enclosure, requiring a co-operative effort between Intel, Microsoft, Nvidia, AMD, and Razer. That kind of R&D doesn't come cheap.



Credit: PowerColor

PowerColor Devil Box

Overclockers.co.uk is currently selling the Thunderbolt 3-based PowerColor Devil Box (£419 from fave.co/2gZh4rG). Like the Core, the Devil Box works with many recent AMD and Nvidia graphics cards. It also has four USB 3.0 ports, one USB-C port, ethernet, and a 500W internal power supply that can support a maximum 375W for the graphics card itself.

PowerColor maintains a list of supported graphics cards and host systems in the specifications section of its Devil Box web page (tinyurl.com/ybt58wph). Be sure to check it out before you buy.

The rest

Those aren't the only eGPU boxes around. Gigabyte recently launched the Aorus GTX 1070 Gaming Box, which comes with a GTX 1070 preinstalled \$600

(£TBC). Zotac is working on a graphics card dock, too. Even Apple is rolling out an external graphics dock for MacBook users. And for anyone with an Alienware laptop there's also the Alienware Graphics Amplifier, which uses a proprietary connector but only costs £175 from tinyurl.com/ycrwxy8f.

But enough about pricey enclosures for pricey new laptops. Let's get into transforming older notebooks into gaming machines with our DIY eGPU guide for the Thunderbolt 3 deprived.

The eGPU glossary

Before we get started, we need introduce a few terms. Without a basic vocabulary, the world of eGPUs can get confusing, fast. There's not much to see here for veteran gamers – you can skip to the next section.

ATX 24-pin connector

This is another kind of power connector that is commonly used with PC power supplies, and is one of the power options on PCIe adaptors.

BIOS

This is the program that first starts when you boot your computer. It's usually accessed by hitting F2, another F key, or a special button on your laptop. The BIOS controls a variety of options for your PC including, for example, the boot order.

Express Card Slot

This is the spot in your laptop that is reserved for wireless broadband cards from a mobile carrier.

FEATURE

Frames per second (fps)

The gold standard for PC gamers is 60fps, though 30fps is considered playable. Many modern console games still run at 30fps.

mPCIe

This is an interface that some eGPU enthusiasts use to connect their graphics card to their laptop instead of an ExpressCard. It offers a better connection, but can be a hassle because most mPCIe slots are inside the laptop.

PCIe x16

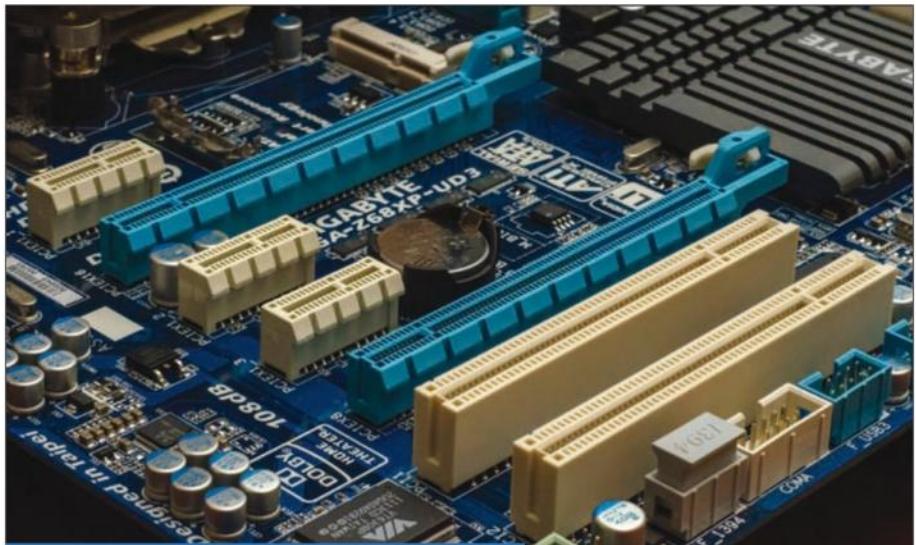
PCI Express (PCIe) is the motherboard slot that a standard graphics card fits into. The 'x16' part means the PCIe slot has 16 lanes that data can travel through. With an eGPU setup we typically compress an x16 slot down to an x1 (1 lane) or x2 (2 lanes) connection to the laptop. That sounds like a raw deal, but it works surprisingly well. PCIe slots come in three generations: 1.0, 2.0, and 3.0. Most new graphics cards will run on PCIe 3.0, which is backward-compatible with version 2.0. PCIe 4.0 is also in the works but the specification, while nearly final at the time of writing isn't expected to be rolled out until later in the year.

PCIe power connector

PCIe can also refer to a type of power connector with six or eight pins.

PCIe adaptor/board

This is a small circuit board with a PCIe slot, some HDMI slots, and a whole bunch of power options. The only



PCIe slots in a standard ATX motherboard

Credit: IDG

point of the PCIe adaptor is to help the graphics card communicate with the laptop.

Thunderbolt

Intel's blazing fast I/O technology is also an option for an eGPU connection, including DIY set-ups.

eGPU basic components

A typical eGPU setup requires five basic items: a laptop, a desktop graphics card, an external display, a PCIe adaptor/board or enclosure for the card, and a separate power supply for the graphics card (though Thunderbolt 3 enclosures have built-in power supplies). You may also want a laptop cooling pad if you want to play games that go heavy on graphics, like Battlefield 1.

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Ideally, your laptop packs an Intel quad-core Core processor, or a dual-core Core processor with Hyper-Threading technology. A solid-state drive (SSD) can also improve your gaming experience, but it's not a necessity. The PCIe board is a specialized piece of equipment. We used BPlus' PE4C v3.0, which works over mPCIe or ExpressCard connections. It offers a PCIe-3.0 x16 slot, plus a nice stand to support your card. The PCIe board comes as a kit with power connectors and an HDMI-to-ExpressCard cable that allows the graphics card to interface with your laptop. Anyone interested in using an m.2 slot should look at the PE4C v4.1. The downside is that the latter supports only PCIe 2.0, while the former supports PCIe 3.0.

Do your hardware research

Not all eGPU experiences are created equal, but they all have one thing in common: You have to do a bit of research before you get to the plug-and-play part. In fact, you may discover that your particular laptop is not plug-and-play-ready whatsoever, requiring some software tweaks to function properly.

The first thing you should do is read about the experiences other external graphics users have had with your laptop model. You'll find a ton of eGPU users out there, and unless your model is particularly new or obscure, chances are high that someone has already created an eGPU setup with your laptop model.

If you don't find anyone with your model, go back a generation, or search for laptops from the same manufacturer to get a sense of the difficulties. Several sites can help with DIY eGPU research. The first is eGPU.

io, which is Nando's current home and solely dedicated to the art of external graphics card configurations. Others include the TechInferno (tinyurl.com/h3dk9jq) and NotebookReview (tinyurl.com/naevvan) eGPU threads. Reddit has a very active eGPU community at tinyurl.com/y84agr7n.

One of the most common road blocks people run across is what's known as 'error 12'. This happens when your Windows system decides it doesn't have enough resources to run the graphics card. Error 12 can usually be fixed with solutions such as Setup 1.35, a paid software utility by Nando (tinyurl.com/ybwgok6z).

For more references also check out YouTube, which is full of people running benchmarks or shooting video of their eGPU setups.

Choosing your graphics card

Once you've figured out what kind of eGPU experience you're likely to have, it's time to start shopping for a graphics card. (Note: A good AMD Radeon or Nvidia GeForce

Before I bought eGPU supplies for my 2011 Lenovo ThinkPad X220, I had to research exactly what I'd need



Credit: Lenovo



Credit: Sapphire

card is hard to find these days, thanks to insatiable cryptocurrency miners, but this advice will help you choose from whatever's available.)

I wouldn't advise going for a top-of-the-line card like the GeForce GTX 1080 Ti (£799 from fave.co/2gZTwTx). Instead, I'd advise you to keep your graphics card budget around £200 to £300 or less.

You can get a really great 'sweet spot' card for under £300 that should provide at least a few years of future-proofing, such as the Sapphire Radeon RX 580 (£288 from tinyurl.com/y7lxt47r) or the Zotac GeForce

GTX 1060 (£239 from fave.co/2h0iGBk). Both are great cards for 1080p gaming with few compromises. The MSI GeForce GTX 1050 Ti (£120 from fave.co/2gZRaEl) provides solid entry-level 1080p gaming.

You'll likely see better performance with a higher-grade card, but it'll be bottlenecked by that PCIe x1 or x2 connection to your laptop. If, however, you plan on buying a new desktop sometime soon, then investing in a high-end card right now can be a way to spread out the cost of a new PC over time.

More importantly, there's no guarantee that an eGPU set-up will work until you actually try it. If you've done the proper research for your particular laptop model, the chances of a bad experience are low. Nevertheless, there are always outliers, and you just might be the lucky one who runs into difficulties.

The other decision is whether to go with an AMD or Nvidia card. Most eGPU users tend to go with Nvidia, so that's what I did.

One thing to keep in mind is that your graphics card typically needs its own power connector to work in an eGPU setup. That could be a problem for cards with minimal power requirements like the GeForce GTX 1050 Ti, which draws its power from the motherboard.

My card, the older GTX 750 Ti, also doesn't require a power connector in its stock design. I didn't test whether the stock GTX 750 Ti would work with a BPlus board, as I bought an overclocked version of the GTX 750 Ti that comes with a 6-pin PCIe power connector. If you like the looks of a card like the RX 560 or the GeForce 1050 I'd advise looking for a similarly overclocked card that comes with a power connector.

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Picking your power supply

Along with your graphics card, you'll also need a power supply unit (PSU) in a DIY eGPU build. There are many reputable brands of PSUs out there, including EVGA, Cooler Master, Corsair and Seasonic.

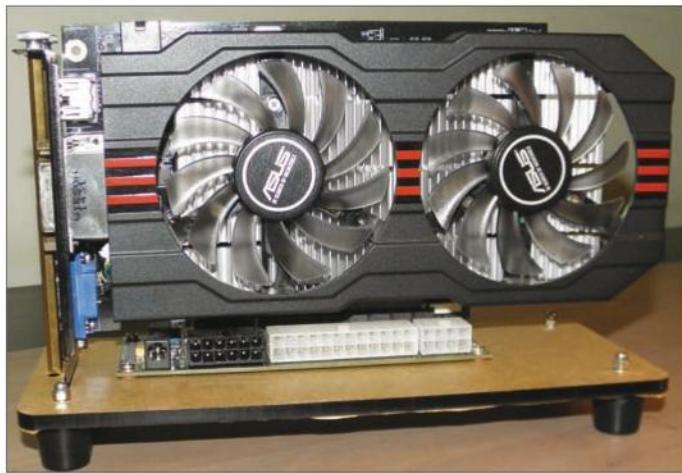
Alternatively, you may only need a power brick similar to what powers your laptop. Take Nvidia's GTX 1050 Ti graphics card, which requires 75W of power, according to Nvidia's specs. Your PSU needs about 15 percent more power than the card (not the system) requires, meaning a 75W card will need at least a 90W power supply.

Setting up your eGPU

The research is done, your PCIe board has arrived, your graphics card is ready for unboxing, and so is the PSU. It's time to get this eGPU rocking.

For our example, we're hooking up an Asus GeForce 750 Ti overclocked edition (£113 from tinyurl.com/y744ytf3) and a Corsair CX430M PSU (£59 from tinyurl.com/ycndnlq9) to a PE4C 2.1a from BPlus. The board connects to a Lenovo X220 laptop via an ExpressCard slot, and the card also connects to an external 22in 1080p display via one of the 750 Ti's DVI ports.

First, slip your graphics card into the PCIe slot on the BPlus board (pictured opposite). Next, hook your (not yet powered-on) PSU's 24-pin ATX power supply pins into the BPlus board. Now connect the 8-pin PCIe connector on the board to the 6-pin power connector on the graphics card. Finally, insert the ExpressCard cable into the laptop, then slide the opposite side of the cable – the one with the HDMI connection – into the HDMI



Credit: IDG

port labelled 'X1' on the PCIe adaptor. At this point you'd also connect your graphics card directly to your external monitor, typically via HDMI or DVI.

Now it's time for the moment of truth. Flip on your PSU (don't worry if nothing happens yet), power on the external display, and then boot your laptop – or at least, that's the boot order that works for me. Some users report that booting an eGPU setup works only when they hook into the ExpressCard slot after the initial boot, or when Windows has loaded.

Whatever your boot order is, and assuming you had a plug-and-play setup like I did, you should boot into Windows as usual. Your laptop may make a few false starts before it powers on correctly, because you've added new hardware to it. Once you're in Windows, you can check to see if your graphics card is detected by opening the device manager and looking under Display adaptors.

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If your graphics card is unidentified, manually download and install your card's drivers from AMD (tinyurl.com/m3655pm) or Nvidia (tinyurl.com/oanwhm5). You may then need to reboot the system to get your eGPU setup working properly.

Once that's done it's on to the wonderful world of gaming. Here's a look at some eGPU benchmarks I ran on my own GTX 750 Ti-powered setup to give you a sense of what to expect from a comparable system. Remember that the GTX 750 Ti is an entry-level graphics card, too. More expensive and more recent graphics cards can obviously perform much better.

DIY eGPU benchmarks

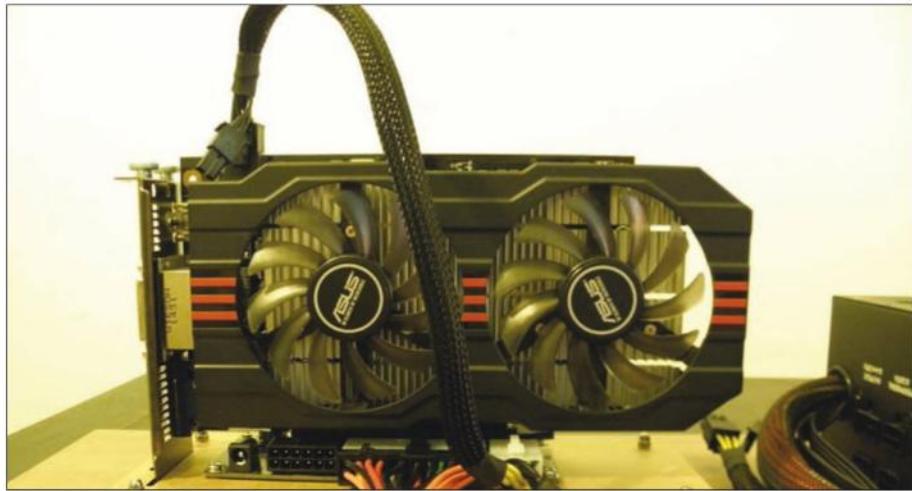
These tests are not meant to be representative of the 750 Ti's performance, but of what an average eGPU setup can expect with similar hardware. My tests used a PCIe 3.0 graphics card over a PCIe 2.0 connection. Results would likely be higher with the BPlus PE4C 3.0 not only because of the newer PCIe slot, but also because the HDMI-ExpressCard cable that comes with that kit supplies a better signal to the laptop.

After looking at my numbers for Witcher 3: The Wild Hunt most hardcore gamers will likely cringe in horror. I had to dial it down to medium graphics at 720p resolution to get to a consistent 30fps or more and hit console-level quality – and that was with Nvidia Hairworks turned off. Witcher 3 is very graphics-intensive, but I noticed serious stuttering and other problems only when the frame rate went below 22fps.

Again, the fact that I can play the game at all, and in full-screen, is a huge step forward over integrated

graphics – which couldn't run Witcher 3 whatsoever. A more powerful graphics card would offer higher frame rates. Less intensive games easily clear the 30fps mark, however, including Metro: Last Light Redux, which I've benchmarked. To put the integrated graphics performance in proper perspective, however, I've also included some screenshots of the benchmark running with the eGPU disconnected. All those backpacks floating in midair are supposed to be attached to soldiers, but the integrated graphics simply can't handle them.

Not all games run flawlessly on my eGPU setup, however. I tried Battlefield 4 and the game ran for only 10 minutes before it failed. Buy your games from online retailers with return policies like GOG and Steam, or that offer limited-time trials like EA's Origin. You don't want to be stuck paying £60 for a game that won't work on your system.



Credit: IDG

FEATURE

Older PCs to lose Windows PC updates

Windows PCs with Intel's Clover Trail Atom chips can't upgrade to the Windows 10 Creators Update. **BRAD CHACOS** reports



Credit: iStock

Owners of some Windows 10 laptops and tablets are crashing into a worrying road block when they try to install the Windows 10 Creators Update. Windows Update initially says the notebooks are compatible with the upgrade, but fails to install it after downloading the setup files, instead displaying the following message: "Windows 10 is no longer supported on this PC. Uninstall this app now because it isn't compatible with Windows 10."

That sounds ominous, but you don't need to uninstall your existing version of Windows 10, and there's no app to uninstall. Instead, the message means your PC's hardware isn't compatible with the Creators Update, or any future Windows 10 updates. Here's what you need to know about the error, which currently affects PCs powered by Intel's Clover Trail processors.

What processors and PCs are affected?

A recent ZDNet article thrust this issue into the spotlight, but Microsoft laid out details about the error in an April forum post. Microsoft won't let affected hardware install the Creators Update because "Icons and/or text throughout the Windows interface may not appear at all, or may appear as solid colour blocks on some devices."

Devices with these Intel 'Clover Trail' processors are impacted:

- Atom Z2760
- Atom Z2520
- Atom Z2560
- Atom Z2580

Those chips have all been placed in Intel's "End of Interactive Support" phase, which means the company won't even respond to tech support queries related to the hardware. If a hardware partner stops supporting a given device or one of its key components and stops providing driver updates, firmware updates, or fixes, it may mean that device will not be able to properly run a future Windows 10 feature update," Microsoft told our colleagues at PCWorld.

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Clover Trail processors powered the earliest Windows 8 2-in-1 hybrid devices, such as the HP Envy X2 and the Asus VivoTab. If you embraced Microsoft's vision for a versatile future for Windows in the early days, you're now left stranded if you accepted – or were forced into – the free Windows 10 upgrade for your Windows 8 PC.

Windows 10 Creators Update

You won't be able to install this, but you might be able to in the future, according to the April forum post:

"Microsoft is working with our partners to provide compatible drivers for these processors. Until then, Windows Update will prevent devices containing one of the processors listed above from installing the Creators Update."

Compatibility issues like this are likely why Microsoft warns against installing the Creators Update on your own, and instead advises users to wait for Windows Update to offer the upgrade. If Microsoft and Intel fix the issue with Clover Trail processors, the Creators Update should be automatically pushed to your system.

Security patches

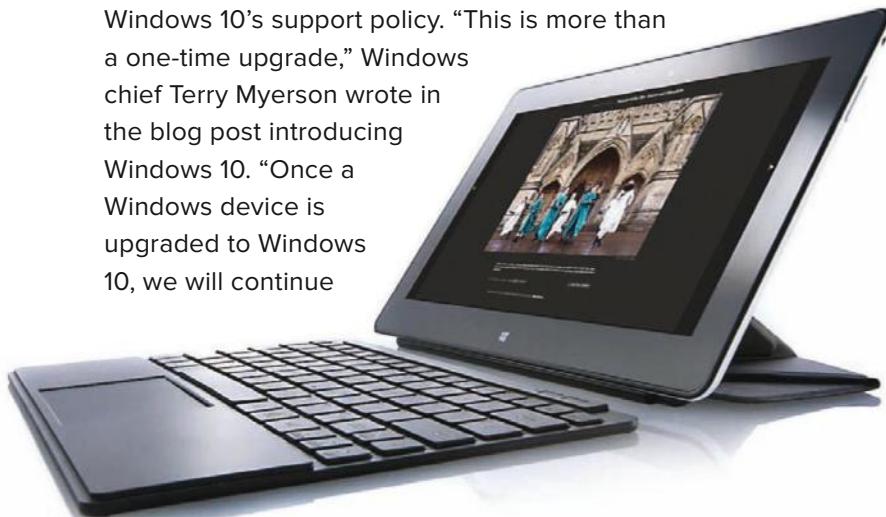
Your Clover Trail system should be running the Windows 10 Anniversary Update if you're trying to upgrade to the Creators Update, and Microsoft said affected systems will continue to receive security patches until January 2023, the original end of support date for Windows 8.1. That's great – you don't want to use an unsupported operating system in this era of

ransomware and government-made malware run amok. You won't receive any new feature updates in that time frame, however, which means the fresh goodies in the Windows 10 Fall Creators Update and its successors will also be off-limits. If that's a concern, you'll probably want to pick up a new laptop.

Other PCs

It's impossible to tell whether other processor architectures will fall prey to the "Windows 10 is no longer supported on this PC" error in the future. Microsoft's stance in regard to Clover Trail certainly suggests it could happen, which we dive into in-depth in our confirmation article regarding Windows 10 cutting off older CPUs.

This debacle shines a light on an unclear clause in Windows 10's support policy. "This is more than a one-time upgrade," Windows chief Terry Myerson wrote in the blog post introducing Windows 10. "Once a Windows device is upgraded to Windows 10, we will continue



The Clover Trail-powered Asus VivoTab

Credit: Robert Cardin

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to keep it current for the supported lifetime of the device – at no cost.”

“The supported lifetime of the device?” What does that mean? As Ed Bott points out in his ZDNet article, Microsoft’s Windows life cycle support page includes a footnote that clarifies the policy. Well, kind of. Not really.

“A device needs to install the latest update to remain supported. Updates may include new features, fixes (security and/or non-security), or a combination of both. Not all features in an update will work on all devices. A device may not be able to receive updates if the device hardware is incompatible, lacking current drivers, or otherwise outside of the Original Equipment Manufacturer’s (‘OEM’) support period.”

Microsoft’s policy is frightfully unclear. If heavily hyped devices a mere three or four years old can be kicked off the support bandwagon less than a year after the free Windows 10 upgrade ended, it certainly seems plausible that other hardware could be quietly dumped in the future – especially if it wasn’t designed for Windows 10 specifically. Fingers crossed this is more of a one-off occurrence. Google, by comparison, has an end-of-life policy for Chromebooks after five years, with the vague suggestion that the company may support a device for longer.

How To: Reclaim your privacy in Windows 10

Windows 10 shares a lot of data with Microsoft. If you lean more towards privacy, **IAN PAUL** reveals how to limit what you share



Credit: iStock

There's no doubt about it: Windows 10 is studded with data-tracking tidbits and hooks into all sorts of Microsoft's online services. Handing over all that data has some tangible benefits, like Windows 10's OneDrive integration and the Bing-powered brains behind the Cortana digital assistant, but not everyone is thrilled with the idea of an operating system that's constantly looking over their digital shoulder.

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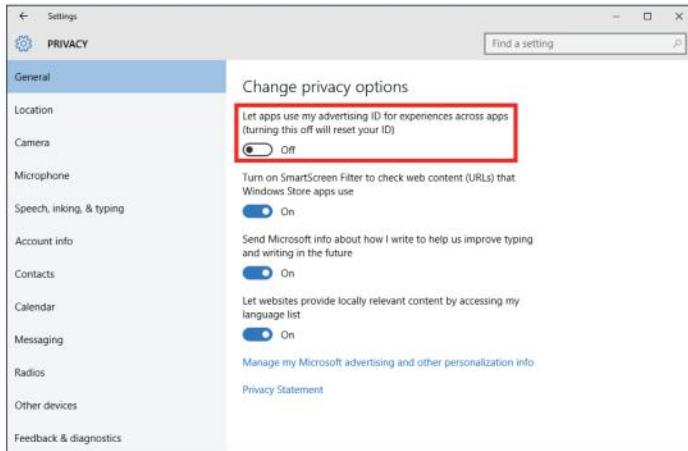
Don't fret. We're here to show you how to get your PC and its data out of the cloud and back on silicona firma. (Yes, I did just make that up.)

This guide will show you how to disable Windows 10's integration, as well as provide tips on what those features actually do. That way you can decide whether you want to keep any of it active or just shut the door on it altogether.

Advertising

One setting you should consider disabling is all the advertising integration in Windows 10. Some of this was also present in Windows 8, but if you're just learning about it now you might as well turn it off.

Personally, I don't mind seeing ads on websites, because that's what pays for most of the free content we see online – including this site's. What I do mind is 'ad personalization'. I don't need ads that are supposedly tailored to my personal tastes thanks to



Credit: IDG

little cookie spies that follow my travels around the web. Generic ads targeted at a site or app's most likely demographic are just fine by me, thanks.

Turning off personalized ads in Windows 10 is a two-step process. First, go to Settings > Privacy > General and slide the option that says 'Let apps use my advertising ID for experience across apps (turning this off will reset your ID)' to Off. (We'll come back to the Settings app later to deal with the rest of those privacy settings.)

Next, open your web browser and go to choice. microsoft.com/en-us/opt-out. There, select Off for 'Personalized ads wherever I use my Microsoft account' and 'Personalized ads in this browser'.

Tip: If you are using an ad blocker or an extension like the EFF's Privacy Badger, you may have to turn it off for this site before you'll see the option to turn off in-browser ad personalization. The site apparently has to set a cookie for this second option to work.

Cortana

Microsoft's built-in digital assistant is useful for quickly setting reminders, calendar events, and sending email, among many other things. The information it collects is very similar to what Google does with Google Now, which you may already be using on your Android device.

But if you're just not into Cortana, turning it off is very simple. And if you've never used Cortana, then don't worry about it. It's already off.

For everyone else, click the Cortana icon in the taskbar, and then click the notebook icon on the left-hand side of the pop-up panel. Select Settings from

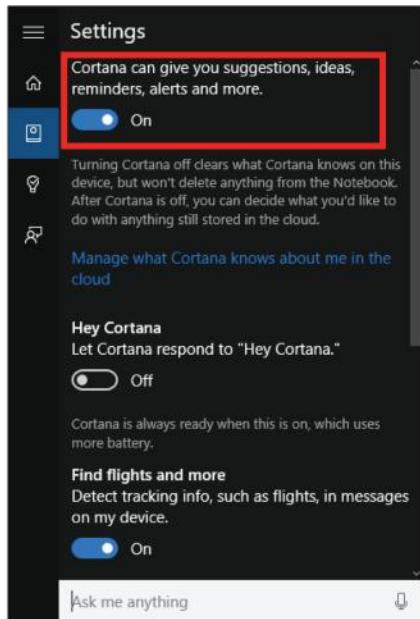
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the list of options that appear. Next, slide the top option that says ‘Cortana can give you suggestions, ideas, reminders, alerts, and more’ to Off.

Once Cortana is gone, you’ll see a new option that says ‘Search online and include web results.’ As its title suggests, this includes Bing results when you search for things on your PC. You’ll have to decide whether you want that enabled.

At this time, it’s also a good idea to jump back into the Settings app’s privacy section. Open Settings and go to Privacy > Speech, inking, and typing. This is a setting that allows Cortana to gather all kinds of data about you to help it deliver services. Click the Stop getting to know me button to end that. Note that this will delete collected data stored on your PC, and it also turns off dictation functionality.

Once that’s done, click ‘Go to Bing and manage personal info for all your devices.’ This is where you can scrub any data that Microsoft has collected about you from the company’s servers. Clearing this data will affect the performance of Cortana and other personalization services across your devices and Microsoft services. You can read through this page to understand what you’re losing, or just jump to the bottom and click Clear.

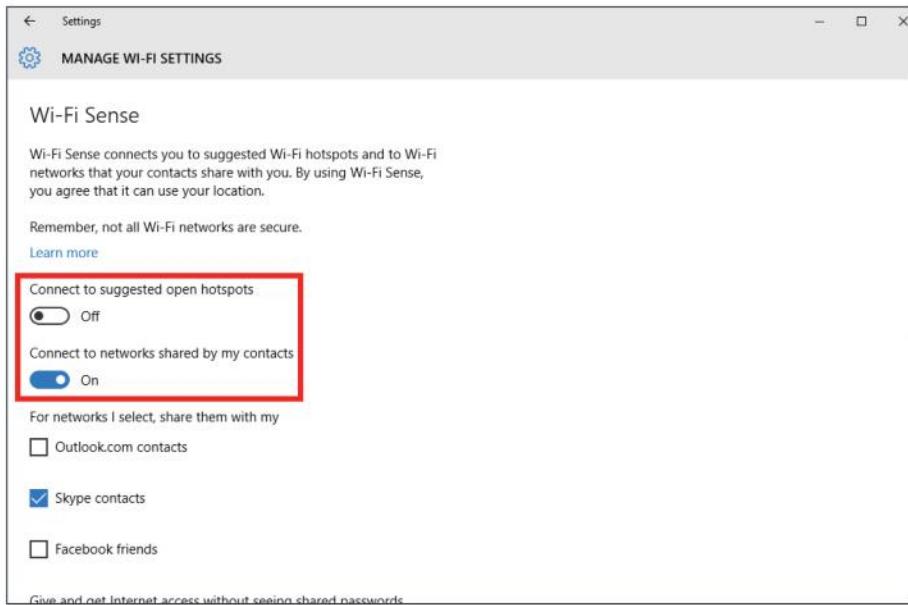


Credit: IDG

Wi-Fi Sense and peer-to-peer

Wi-Fi Sense is turned on by default, but it doesn't do anything unless you explicitly use it. Wi-Fi Sense lets you share access to password-protected Wi-Fi routers. The passwords are shared silently in the background over encrypted connections. People with whom you share network access never see the actual passwords, and they cannot grant sharing permissions for their friends.

The idea is that if your friends or family come over to your house, they don't have to ask for your password. Instead, anyone who uses a Windows 10 device and is a digital friend of yours is automatically logged in. This is arguably more secure than sharing your password – once a person knows your Wi-Fi password they can easily share it with others, after all.



Credit: IDG

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To make sure Wi-Fi Sense is off and stays off, go to Settings > Network & Internet > Wi-Fi > Manage Wi-Fi Settings. Then slide the two options that say ‘Connect to suggested open hotspots’ and ‘Connect to open networks shared by my contacts’ to Off.

Moving on, Windows 10 shares system files and updates downloaded to your PC with others by default. This peer-to-peer networking feature turns you into what you might call an unwitting good Windows citizen by helping others get updates and system files faster. In return, your PC also receives update bits via other people’s PCs. It’s like using a BitTorrent client, essentially.

If you don’t like the sound of that, go to Settings > Update & Security > Windows Update > Advanced options > Choose how updates are delivered. By default, ‘Updates from more than one place’ is enabled and set to both local sources and other PCs on the Internet. You have two additional choices, however: You can distribute updates only to PCs on your local network, or shut off the P2P updates entirely and stick to using Microsoft’s servers alone.

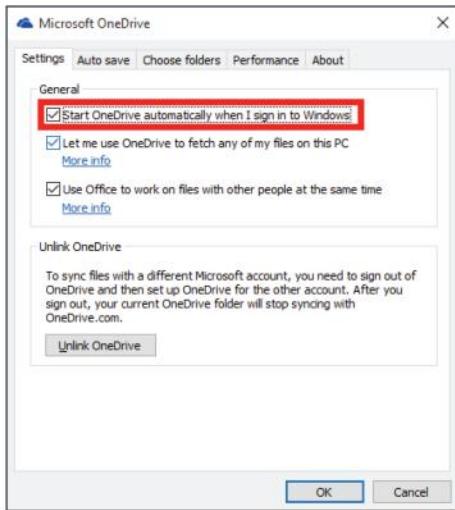
If you want to shut off everything, just turn the slider on this screen to Off. If you want to share with PCs on your local network, leave the slider in the On position and select the radio button that says ‘PCs on my local network.’

OneDrive

If you’re not interested in storing your files on Microsoft’s cloud servers, you can turn off OneDrive so it stops bugging you to configure it. Just click the upward-facing arrow in the system tray on the right-hand side of the

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taskbar. Then right-click the OneDrive icon and select Settings. In the new window that opens, uncheck ‘Start OneDrive automatically when I sign in to Windows.’ You can also uncheck the other two boxes if they’re selected as well: ‘Let me use OneDrive to fetch any of my files on this PC,’ and ‘Use Office to work on files with other people at the same time.’



Credit: IDG

Back to Settings

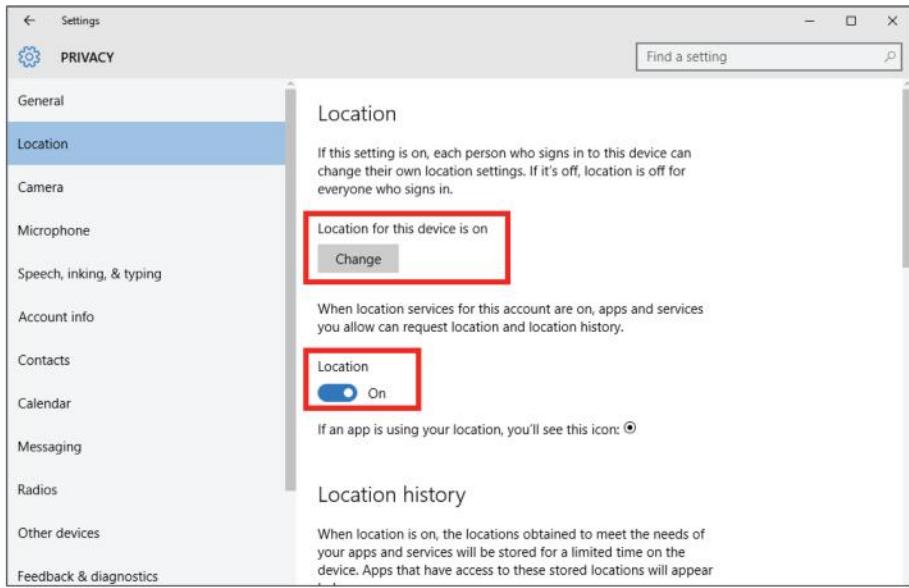
It’s time to dive into all those other privacy options in the Settings app by going to Settings > Privacy.

This is really the core of Windows 10’s privacy controls, but most are not as critical as the other items we’ve covered. The exception would be the remaining items under Privacy > General. Here you’ll want to turn off ‘Send Microsoft info about how I write to help us improve typing and writing in the future.’ You may also want to shut off ‘Let websites provide locally relevant content by accessing my language list.’

After taking care of the settings under General, what you’ll mostly see in the remaining sections are methods for apps to access your data.

Each panel is pretty self-explanatory. The Location section lets you control whether apps can use your

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Credit: IDG

location to deliver services like weather forecasts and local news. Location is a little unusual, because it can be set both on a per-device or per-user basis. To turn off location for the whole PC, click the Change button. To turn it off for only the logged-in user, turn the Location slider to Off. You can also control location settings on a per-app basis by scrolling down to ‘Choose apps that can use your location.’

After location is taken care of, the rest of the settings follow a similar format, allowing you to turn off access to things like your camera, microphone, contacts, and calendar on a system-wide or per-app basis. Just be careful not to let your privacy zeal impact truly useful features. The Mail app has reasonable justification for accessing your contacts, for example.

Microsoft Edge

Even if you use Microsoft's fancy new browser, you may want to disable some features – like Cortana integration and typing prediction – if you don't want to send any data back to Microsoft.

Open Edge and click on the menu icon in the far right corner (three horizontal dots). Go to Settings > View Advanced Settings. Here you have the option to turn off Adobe Flash and under 'Privacy and services' you can decide to switch off a number of settings.

Microsoft Edge's Advanced options include:

- **Offer to save passwords** and **Save form entries** are both on by default. They are handy features though.
- **Have Cortana assist me in Microsoft Edge** lets Cortana work inside the browser. If you've already switched off Cortana, you definitely don't want this feature on.
- **Show search suggestions as I type** uses Microsoft's web-powered prediction service to guess what you're searching for and fill it in automatically. Chrome and the standard version of Google search offer something similar, so you may already appreciate this convenience elsewhere and not realize it.
- **Use page prediction to speed up browsing, improve reading, and make my overall experience better** is similar to search suggestions in that it sends your browsing history to Microsoft. The company says this feature "uses aggregated browsing history data to predict which pages you're likely to browse to next, and then loads those pages in the background for a faster browsing experience." If you don't like the sound of that, turn it off.

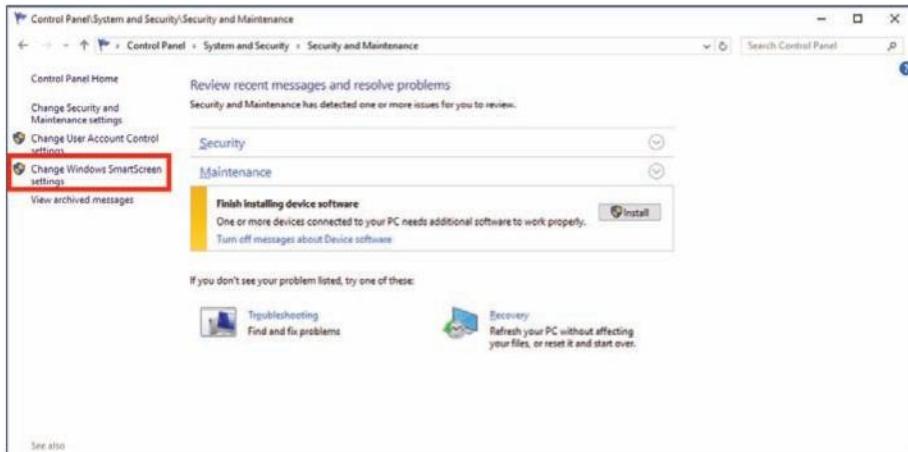
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- Help protect me from malicious sites and downloads with **SmartScreen filter** lets Microsoft block malicious sites and downloads from infecting your PC. This feature lets Microsoft download a list of bad-acting URLs to your PC so Edge can block those sites. With SmartScreen active, whenever you land on a malicious URL you will be redirected to a Microsoft web page that will get some PC information and the URL of the page you visited. If you ask me, the SmartScreen filter is pretty benign and well worth keeping activated.

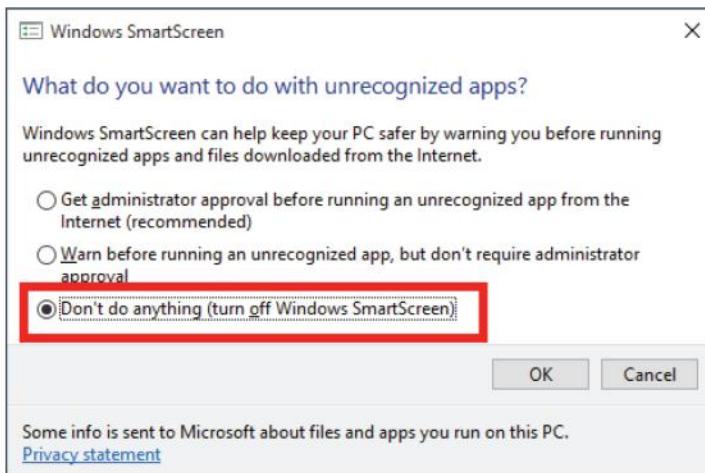
For more information, check out Microsoft's Edge privacy FAQ at tinyurl.com/y7wt9tLx.

Control Panel SmartScreen

There are three SmartScreen filters in Windows 10. The second one is in the Control Panel and stops you from installing potentially malicious desktop programs on your PC. It first appeared in Windows 8.



Credit: IDG



Credit: IDG

To offer this security feature, however, you have to share with Microsoft anonymized information about the programs you download and install.

Advanced users may just want to disable this feature, as it tends to be a nuisance. I'd strongly advise novice and intermediate users to leave SmartScreen as-is, however. To disable it, right-click the Start menu button and select Control Panel from the context menu. Then, with the category view enabled, navigate to System and Security > Security and Maintenance. Select Change Windows SmartScreen settings from the left-side pane.

In the window that opens, select the radio button next to 'Don't do anything (turn off Windows SmartScreen).'

Windows 10 and the web

Next we'll examine the way Windows 10 syncs your personalized settings across devices, including your desktop background, web browser settings, saved

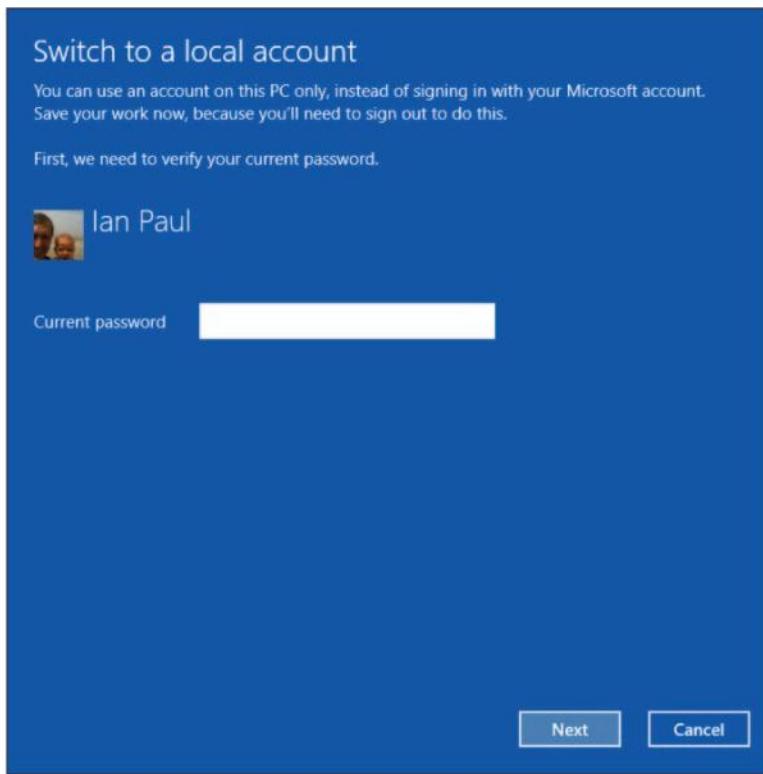
passwords, language preferences, ease of access, and so-called ‘other Windows settings’.

The ability to sit down with any Windows 10 device, log in with your Microsoft account, and have all your settings and preferences immediately show up is powerfully handy indeed. But if you’d rather not store all that information in Microsoft’s servers, the easiest thing to do here is just turn the Sync settings option found under Settings > Accounts > Sync your settings to Off. If you want to take a more fine-grain approach, you can drill down into the synced items under ‘Individual sync settings.’

Finally, let’s move on to the SmartScreen Filter – the Windows Store version we saw previously under Settings > Privacy > General. Like its Edge counterpart, SmartScreen Filter checks the URLs of Windows Store apps and makes sure they’re not up to anything fishy. It’s a security measure that I’d argue is worth turning on. But if you’d rather not use it, go to Settings > Privacy > General and slide the option that says ‘Turn on SmartScreen Filter to check web content (URLs) that Windows Store apps use’ to Off.

Local account

This is basically like putting a Windows 7 user account on your PC, with few ties to the cloud. Navigate to Settings > Accounts > Your account and then select ‘Sign in with a local account instead’. Then just follow the wizard to start using a local account on your PC – one that isn’t tied to your Microsoft account. Using a local account will still let you access some built-in features in Windows 10, such



Credit: IDG

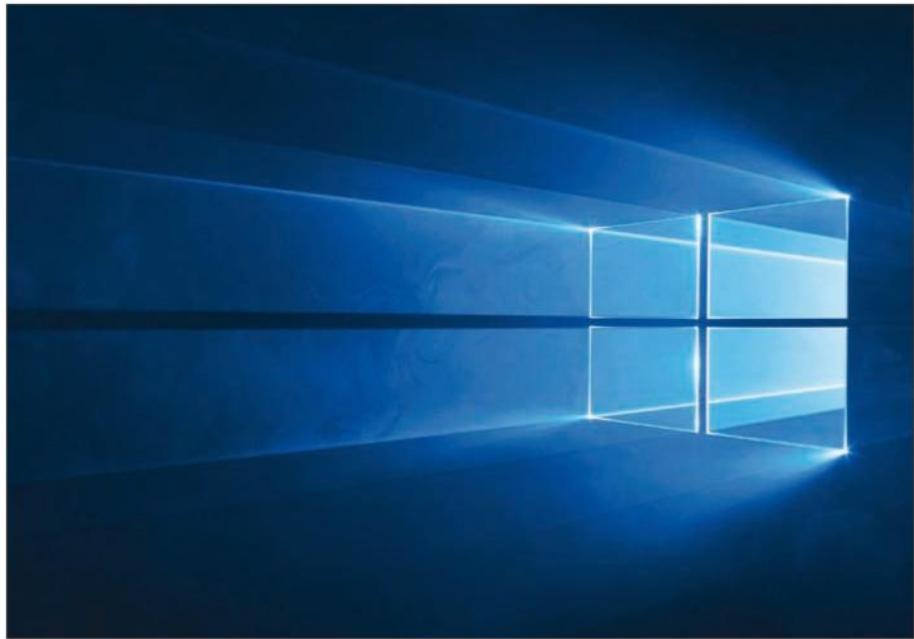
as the Mail app, but you may also lose access to others that require a Microsoft account, such as the Windows Store. You also can't sync your settings to other Windows devices, but if privacy is your focus you probably turned that off in the previous step anyway.

So there you have it: all the privacy steps you need to take to keep Windows 10 firmly planted on the desktop and not the cloud. It's admittedly a lot of work, but the good news is it only takes a few minutes to stay local once you know what you need to do.

HOW TO

How To: Reduce size of Windows 10 installation

Use Compact.exe to slim down the size of your Windows installation, plus other tricks. **JON L JACOBI** shows how



Credit: Microsoft

Windows 10 works best with more disk space. While it's not optimal to run Windows 10 from a 16GB or even 32GB SSD, the OS has some tricks up its sleeve that allow it to run on devices with skimpy storage space, such as tablets. It's not that painful once you take the proper steps.

Live small and prosper

Microsoft designed Windows 10 so that its own files could be reduced in size without using disk compression. The overhead of unpacking stuff reduces performance somewhat, but it can mean the difference between being able to work with the device you've got, and having to buy a new one.

Compressing the Windows 10 files is simple: type **CMD** into the search windows field, right-click on CMD and run as administrator. Once you have a command line, type in **COMPACT.EXE /CompactOS:always** and press Enter. To undo the whole deal, type in **COMPACT.EXE /CompactOS:never**. You can also opt to compress the data on your main drive.

How effective either of these will be depends on the media you're using. Many SSDs already compress data so you may not see much of a reduction. In that case...

Relocate your libraries

Many low-resource computing devices expand their storage with SD or MMC cards. Windows 10 thinks of these as external/temporary storage. Strictly speaking, that's correct: you may be treating the drive as a secondary hard drive, but it can be removed and that can cause issues. Regardless, you can redirect your Documents, Music, Photos, and video libraries to this second drive.

Right-click on the library you want to relocate, click on Properties, choose the Locations tab, then point the library to the secondary drive. I highly recommend that you create a folder with a suitable name such as My Libraries, and not just use the root level.

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Install apps to the secondary drive

Most programs let you change the destination directory, which allows you to install them on a secondary drive.

This generally requires that you choose the Custom or similar option when you first run the setup program. This methodology is very effective in reducing the overall footprint of your Windows installation.

Use portable apps

Even when you install programs to the secondary drive, they may still install DLLs or what-not to your C: drive, or write temporary data and settings there. Portable apps, on the other hand, run from wherever you put them and confine their configuration and temporary data to their installation location.

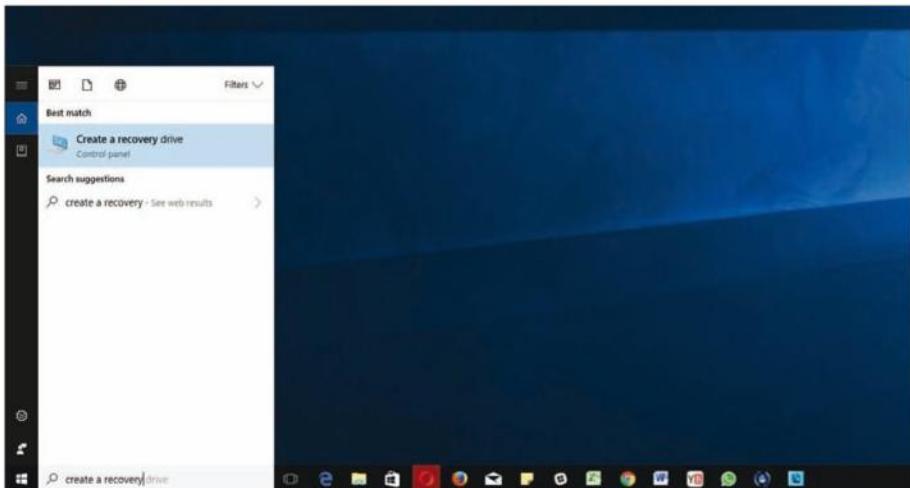


Any number of portable apps are available for free from portableapps.com

Credit: IDG

How To: Create a USB recovery drive

JOSH NOREM walks you through the process



Credit: IDG

You never know when you'll need a Windows recovery drive in order to restore your system to a pristine state, so the time to make one is now – and it's very easy to do.

A recovery drive is similar to the media you'd receive if you bought a prebuilt system. Back in the day, PCs would ship with a CD or DVD that included an image of the system as it left the factory. If your PC's OS went sideways, you could easily restore it to the way things were on day one (though you'd lose all of your subsequently created data and applications, obviously).

HOW TO

Nowadays manufacturers usually just put an image of the system as it left the factory on a hidden partition of your main drive.

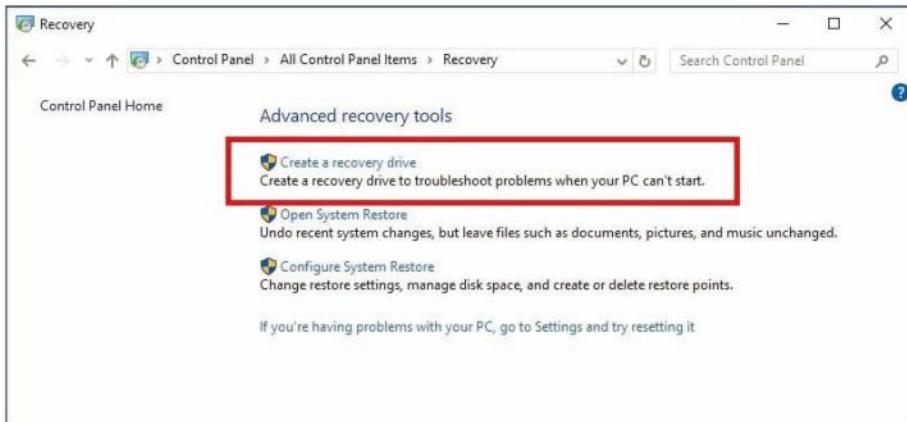
A Windows recovery disk builds on this idea. In addition to letting you reinstall Windows, it includes several troubleshooting tools, which can be lifesavers if your system won't boot.

Some of these tools used to be part of the OS. If your PC failed to boot you were presented with a menu allowing you to try and boot into Safe Mode, or use 'last known good configuration'. That's no longer the case with Windows 10. Now you need these tools to reside on a separate, bootable USB drive, and every person running Windows should keep one in a safe place with the label 'in case of emergency'.

Here's how you create one and what it can do for you. First, obtain an 8GB to 16GB USB drive and insert it into an open USB port on your PC. Next, go into Windows' Control panel (right-clicking the Windows icon is the easiest way) and type create a recovery drive into the search bar. The manual method would be to go to System & Security > Security & Maintenance > Recovery.

You may need to enter your admin password to go further. In the resulting dialog box, check the box labelled Back up system files to the recovery drive.

With your recovery drive created, you'll have to boot from it in order to use it. How your PC boots from USB varies according to your PC's age and motherboard, but typically you can press one of the F-keys during boot to arrive at a boot selection window. From there you select the USB drive you're using, and it should proceed to boot from the recovery drive.



You can easily create a recovery drive using Windows 10's built-in tool

Credit: IDG

When you successfully boot from it you'll see a screen that offers a Troubleshoot option. Click on that and you will see the following: Recover from a drive, and Advanced options (and possibly Factory Image Restore, if available).

The first option lets you reinstall Windows. Note that it says you will lose all your data and installed applications. This is a clean installation of Windows, not a restore from backup or something along those lines.

The second possibility, which is labelled Advanced options, lets you fix your Windows installation in several ways. These include:

System Restore: Use this to revert your PC to a happier time, when things were working normally. This does not affect your data, but it does affect installed programs as it replaces the registry with an earlier version.

HOW TO

System Image Recovery: If you've used the image backup tool in Windows 10, this would be where it would come in handy. You can restore the image of your PC at the time you created the image, which includes your data and installed programs at that time.

Startup Repair: This is sort of a 'black box' in that it tries to fix whatever issue is preventing the system from booting, but it doesn't tell you what it's doing or, if successful, what the problem was. This is the first thing you should try, as it's the quickest and least invasive.

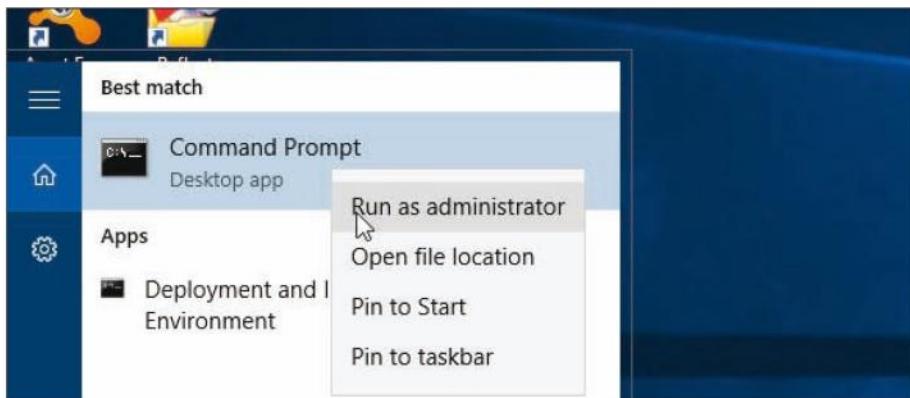
Command Prompt: This can be useful for a wide array of tricks and tactics, most especially running the SFC /Scannow command to scan and fix corrupted system files. We all know the command prompt is a wizard's toolbox, and if you know what you're doing, the possibilities are almost endless.

Go Back to the Previous Build: Though worded a bit cryptically, this lets you revert your PC to the previous build of Windows, meaning the one before whatever update turned everything pear-shaped.

As you can see, it's useful to have one of these recovery drives handy. If for some reason you can't create a recovery disk in Windows 10, we recommend you try the following.

Scan for problems

Your PC may be suffering from a corrupted system file. Here's how to find out and hopefully fix it.



Credit: IDG

Type **cmd** in the Search field. In the search results, right-click Command Prompt and select Run as administrator. Once you're inside the command environment, type **sfc/scannow** and press Enter. The System File Checker (SFC) program will examine Windows files and replace any that appear to be corrupt. This scan rarely takes more than 10 minutes. After the scan, try again.

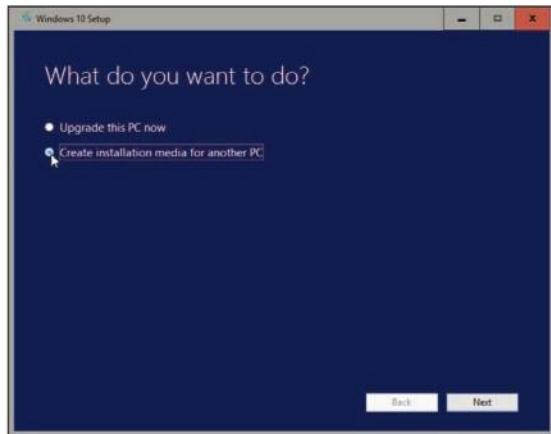
Try another flash drive

Yes, it's obvious, but a lot of people overlook the obvious. You can buy a 4GB flash drive for less than £5, so there's really no excuse.

Create an install drive instead

A Windows 10 install drive is very like a Windows 10 recovery drive. The major differences are that the install drive defaults to reinstalling Windows, and doesn't know the details of your particular Windows installation. First, you'll need to download the media

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Credit: IDG

creation tool (tinyurl.com/nkvmcxp). Be patient; it's a big file. Once you have it, plug in your flash drive, launch MediaCreationTool.exe, select Create installation media for another PC and follow the prompts. When you boot from this drive, the Windows Setup wizard comes up. On the second page of the wizard, ignore the big 'Install now' button and click Repair your computer in the lower-left corner. That brings you into an environment nearly identical to the Recovery Tool.

But if you do a complete reinstall, there's a possibility that it will require you to enter your Product ID number – the proof that you can legally run Windows 10 on this machine. So take a precaution now: download and run Nirsoft's free and portable ProduKey (tinyurl.com/9d3v4). Save the displayed numbers in a safe place.

How To: Find your Windows 10 product key

If you need to reinstall Windows or upgrade your motherboard, **JIM MARTIN** reveals how to find or extract your product key



Credit: iStock

For most people, Windows 10 was either a free upgrade or it came on your new PC or laptop. If you're ever asked for a product key – during a clean install for example – here's how to find it.

Get product key

If you upgraded from Windows 7 or 8, Windows 10 will have activated automatically after connecting to

HOW TO

Microsoft's servers online. You didn't need to enter a product key as you were entitled to Windows 10 by virtue of having a genuine consumer copy of Windows 7 or 8.

There are, however, a few instances where you'll need your product key. If you've upgraded from Windows 7 or 8 and plan to upgrade your PC components, thus wiping your hard drive, you'll need your Windows 10 product key.

If you're installing a new system all together, then you'll also need your Windows 10 product key.

Both the above scenarios involve a fresh install of Windows, and despite Microsoft adding the Activation Troubleshooter tool in the Anniversary Update (find it in Settings > Update & Security > Activation), you might be stuck between a rock and a hard place if you haven't already extracted your Windows 10 key.

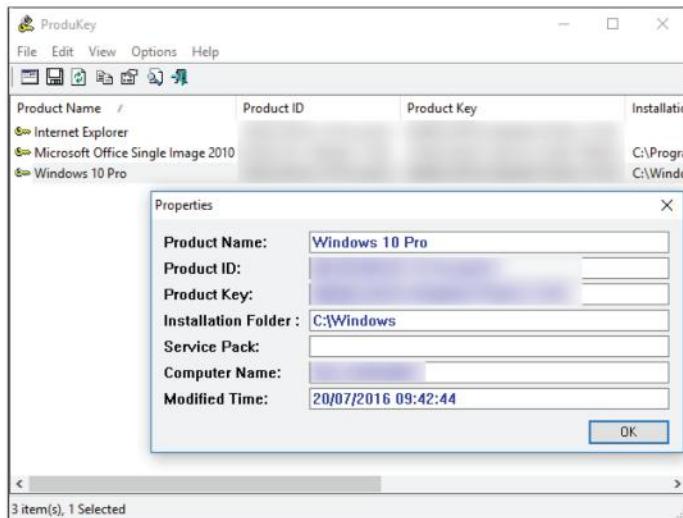
Extract Windows 10 product key

If you bought a PC, laptop or tablet running Windows 10 then it should have a sticker or Certificate of Authenticity which contains the product key, or be included somewhere with the packaging or documentation that came with it.

However, this isn't always the case. One reader told us that, according to HP, it does not put product key on laptops or PCs for security reasons. As with the digital entitlement (now called a Digital Licence), the product key is stored 'somewhere in the computer' and will activate automatically if needed. This will work even if the hard drive fails. He said that the product key was semi-visible on the System screen in Windows: most is redacted with only the last five

of the digits shown. If you've purchased a boxed copy of Windows 10, it will be on a label in the box. If you bought a digital copy of Windows 10 online from Microsoft, you should have received the product key in an email.

If, however, you've not got any of the above, you can extract your Windows 10 product key using ProduKey (tinyurl.com/zqucs5s), which is free software that displays your product key on various software installed on your machine.



Credit: IDG

Note: The program might be flagged by your anti-virus program, as it is a tool used to extract keys – some anti-viruses deem this as a virus or malware, but trust us – it's safe. Write your Product Key on a piece of paper and store it safely. If you ever need to reinstall Windows 10 on another machine or decide to wipe

HOW TO

your hard drive, you can now install Windows 10 directly from a Win10 ISO.

Clean install

Since Microsoft has your computer's 'digital signature' from the initial upgrade it recognises the combination of components when you do a clean install and automatically activates Windows. This means you can safely skip the screen which asks for a product key at the start of the installation process.

It's just frustrating that there's no message to tell you this: the screen is only for those installing a version of Windows 10 they've purchased and which therefore still requires a key.

Windows 10 should activate as long as you haven't made any major changes to your PC. Upgrading from a hard disk to an SSD won't affect anything, nor will changing your graphics card. However, upgrading your motherboard and processor will probably count as 'significant' and you'll have to ring Microsoft's support line if you find that Windows is no longer activated, or you're reinstalling it.

Check if Windows 10 is activated

Right-click on the Start button and choose System from the menu that appears. Under Windows Activation, you should see 'Windows is activated'. Note: If you have the Creators Update installed, you'll see a slightly different screen: click on 'About' at the bottom of the left-hand menu, then on the 'Change product key or upgrade your edition of Windows' link. Then you'll see the status.

Activation

Windows

Edition Windows 10 Pro

Activation Windows is activated with a digital licence

[Learn more](#)

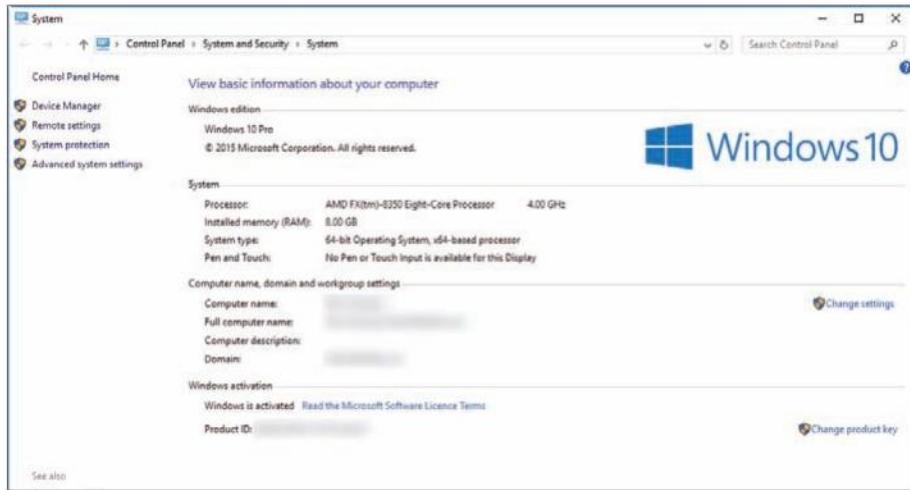
Update product key

To use a different product key on this device, select change product key.

 [Change product key](#)

Credit: IDG

Similarly, if you click on Settings on the Start Menu, then Update and Security you will see the section called Activation. If you're running a version prior to the Creators Update, it will look like this:



Credit: IDG

