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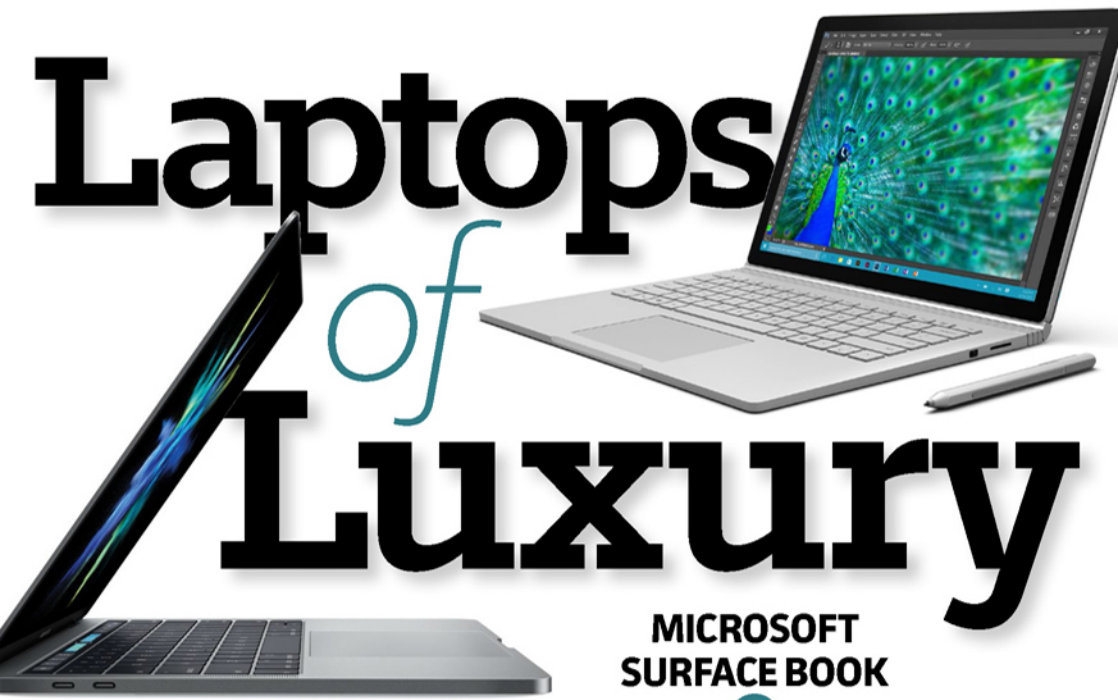

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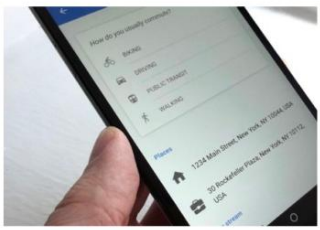

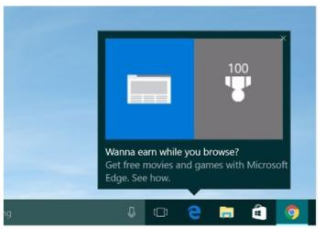

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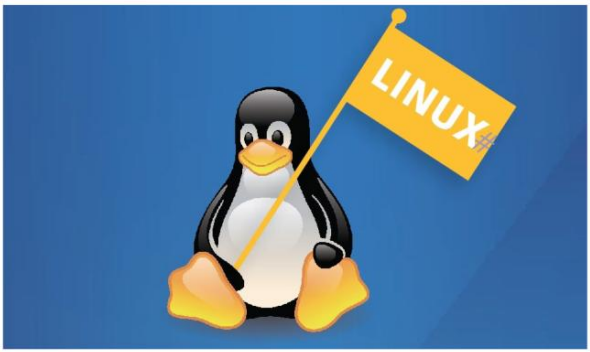

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NEWS

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Everything Microsoft revealed: Surface Studio, Windows 10 Creators Update, and more

BY BRAD CHACOS

MICROSOFT'S BIG EVENT in New York featured plenty of new Surface hardware, but nevertheless, it's easy to see why the company called this a Windows event rather than a Surface shindig.

Windows and devices chief Terry Myerson kicked things off with a tantalizing glimpse of the features that will debut with the new Windows 10 Creators Update, scheduled for release in the spring. The rest of the event was dedicated to new Surface gear designed specifically to marry powerful, thoughtful hardware with the best of those new software features. But don't take my word for it! Here's everything Microsoft announced at its October 26 Windows event.

Windows 10 Creators Update

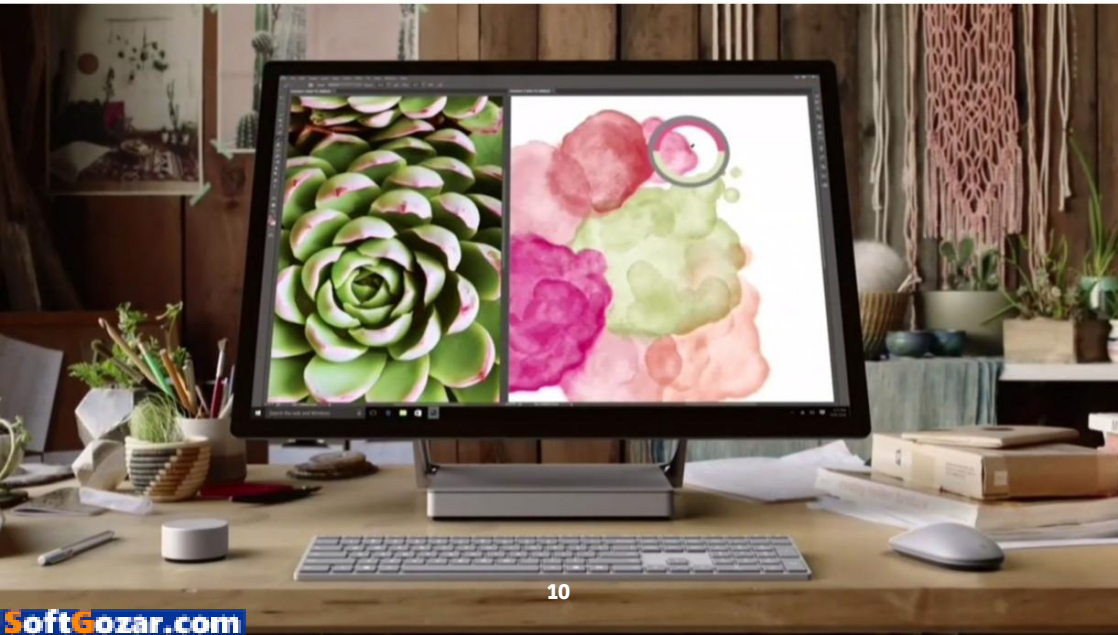
As I said, the freshly revealed Windows 10 Creators Update, scheduled to arrive in early 2017, kicked off the show. The update is built around three key pillars: the creation and manipulation of 3D content, sharing your Xbox Live gaming experiences, and easily communicating with others—hence the name.

We'll touch on the highlights later in this article, or you can check out *PCWorld*'s Windows 10 Creators Update overview (on page 19) for even more nitty-gritty details.

Surface Studio

Microsoft's first-ever desktop PC is the paragon for all those Windows ideals. The Surface Studio all-in-one mixes stunning physical design and impressive internal hardware that's focused on creating the best experience possible for professionals and content creators. From an ultra-slim 4500x3000-resolution screen with "True Scale" 1:1 image recreation, to the ability to lay at a 20-degree angle for natural positioning while sketching, to the 6th-gen (Skylake) Core i7 CPU and Nvidia GPU powering it all, the Surface Studio is laser-focused on helping you get things done. (And showing off Windows in the best possible light, naturally.)

These tidbits are just the tip of the iceberg. Check out *PCWorld*'s Surface Studio (go.pcworld.com/surfacestudio) coverage for more high-level info, our Surface Studio configuration guide (go.pcworld.com/surfacestudioconfig)for hardware details, and Mark Hachman's Surface Studio hands-on (page 28) for initial impressions. If you like what you see, the Surface Studio starts at $3,000 and is available for preorder now (go.pcworld.com/ordersurfacestudio).



Surface Dial

The Surface Studio's content-friendly design and Windows 10's new content creation tools are amplified by the Surface Dial (go.pcworld.com/surfacedial), a radical puck that can control Microsoft's new PC. It's primarily designed to work in conjunction with Microsoft's Surface Pen. Priced at $99, you can preorder it now (microsoft.com/en-us/surface/accessories/surface-dial).

The Surface Dial doesn't have any buttons of its own. Instead, using it reveals an interface wheel customized for specific applications, with selections occurring as you twist the device back and forth. You may cycle through tool-tip brushes in an image editing app, for instance, or rewind and fast-forward through written notes in Office. A virtual version of the Dial appears even if you don't place the puck directly on screen, letting you zoom, scroll, and adjust various options like screen brightness and volume. Mark Hachman's Surface Dial hands-on (go.pcworld.com/surfacedialhandson) explains it all.

Support for the Surface Dial will be baked right into Windows 10, and the accessory will be compatible with the existing Surface Pro 3, Surface Pro 4, and Surface Book (go.pcworld.com/surfacebookrev).

Surface Book i7

Handily enough, Microsoft also revealed a newer, more powerful version of the Surface Book, the aptly named Surface Book i7. The Surface Book i7 swaps in a sixth-gen Skylake Intel Core i7 processor and an Nvidia GTX 965M GPU to deliver twice the power of the most potent original Surface Book, and (Microsoft claims) three times the power of the beefiest 13-inch MacBook Pro at the time (Apple has since rolled out new Macs).

Microsoft also managed to up the Surface Book i7's battery life to a claimed 15 hours, despite the additional firepower, thanks to a redesigned cooling system and, well, more batteries. The Surface Book i7 starts at $2,400 and is available now. (See review on page 64.)

Paint 3D

Windows' venerable Paint app is being dragged into the 21st century. The Windows 10 Creators Update adds Paint 3D, a Windows Store app designed from the ground up to create 3D images even out of 2D pictures.

Paint 3D includes numerous tools for editing three-dimensional images. It also integrates with a new Windows 10 3D-scanning app dubbed Windows Capture 3D, which allows you to digitize real-world objects. Microsoft plans to introduce a "community" hub on Remix3D .com (remix3d.com) for shared 3D images, plus it'll let you drag your creations out of Minecraft. Microsoft Office applications will also support 3D images after the Windows 10 Creators Update rolls out.

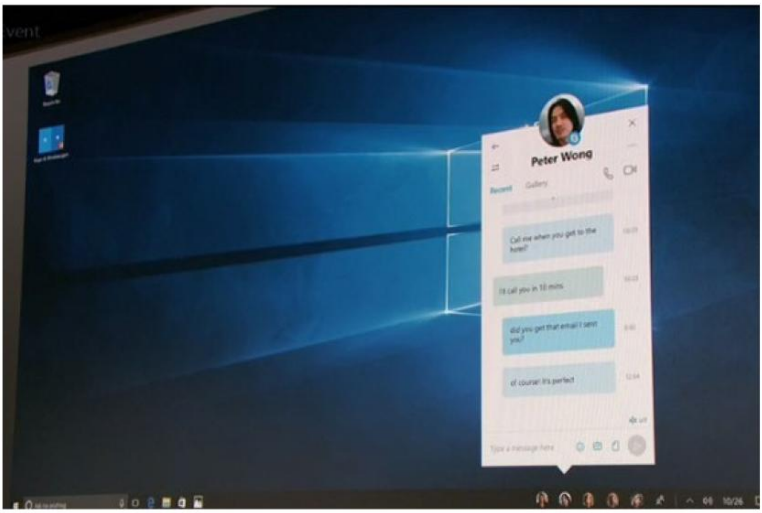
You have to wonder how many non-professionals are interested in 3D image creation, but there's no doubting that Paint 3D looks mighty nifty (go.pcworld.com/windows10paint3d)—and like a perfect match for the Surface Studio and Surface Dial's capabilities.

Windows Holographic VR headsets

You'll be able to view those 3D creations through Microsoft's own HoloLens, or via an onslaught of Windows Holographic-compatible VR headsets apparently coming from Dell, HP, Lenovo, Asus, and Acer.

"These headsets will be the first and only to ship with inside-out, six-degree-of-freedom sensors," said Microsoft's Terry Myerson. "Unlike every other VR headset on the market today, this means there will be zero need for a separate room. Zero need for a complicated setup."

PCWorld's Windows VR headset report (go.pcworld.com/windowsvrreport) has all the details you need to know. Look for these new headsets to launch around the same time the Windows 10 Creators Update lands.



My People

Microsoft wants to make your friends the center of your Windows experience with My People, a feature that borrows from Android and iOS. In the Creators Update, five important contacts will appear as profile images in your taskbar. You'll be able to drop files onto these contacts to immediately share items, or click the contact to interact in a specific app like Mail, Skype, SMS, or Xbox Live. Handy!

For more details on My People, be sure to read *PCWorld*'s Windows 10 Creators Update overview on page 19.

Live PC game streaming

Microsoft's muscling in on Twitch. The Windows 10 Creators Update adds the ability to easily start broadcasting your Xbox Live games via the operating system's Game DVR toolbar, sending notifications out to your pals and fellow club members to let them know when you're online. Once they hop into your stream they'll be able to chat with you, as with every other streaming service out there.

The service is powered by Microsoft's recent Beam acquisition and looks dead-simple to use. It's easy to envision Windows 10 Game DVR live streaming becoming popular on consoles, but Microsoft faces an uphill battle on PCs, where Twitch and tools like Nvidia Shadowplay and OBS already enjoy massive, entrenched user bases.

Custom tournaments and fancy audio

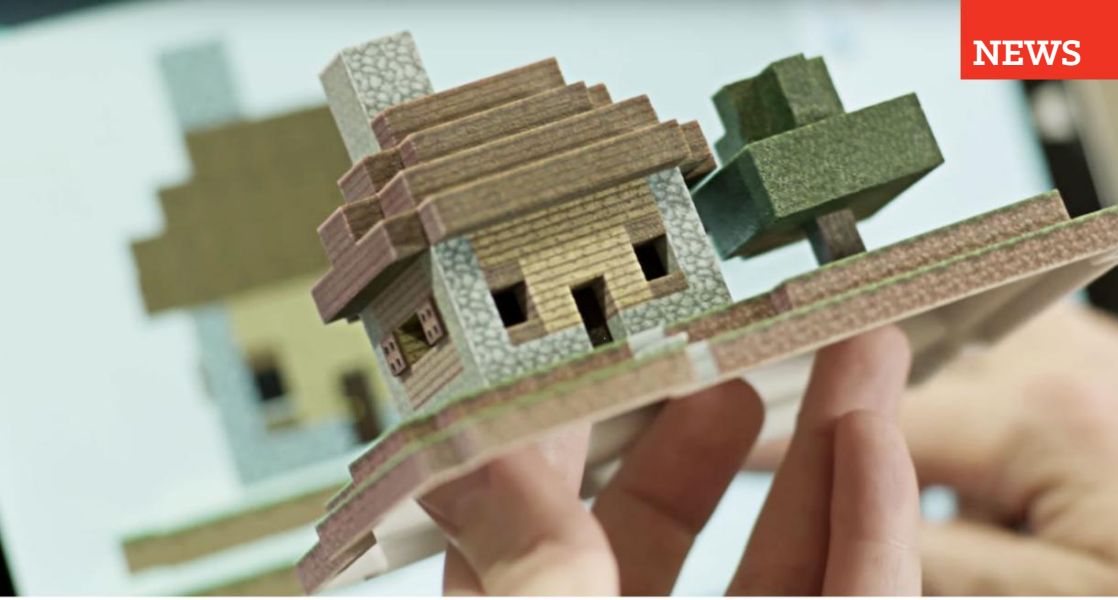
Microsoft's tying console and PC users closer together with custom tournaments powered by Xbox Live's Arena platform. Next year, you'll be able to create your own custom gaming tournaments, controlling everything from the games, to the rules, to the players, to the start times. Previously, Area tournaments were only created by Microsoft and its official partners.

The Xbox One S, which is itself powered by Windows 10, is adding support for bitstreaming Blu-ray audio pass-through and Dolby Atmos. Soon, those 4K videos and games will sound just as glorious as they look.

Surface Mouse and keyboards

The niche Surface Dial isn't the only Studio peripheral Microsoft announced, though none of the others made it onto the stage during the big event. Microsoft quietly launched a Surface Mouse and a pair of desktop Surface keyboards (go.pcworld.com/surfacemouse)—one standard, the other ergonomic—to complement its premium all-in-one PC. All three match the gray aesthetic of Microsoft's first-ever desktop PC. The Surface Studio includes a Surface Mouse and basic Surface Keyboard, however.

You can order all three on Microsoft's Surface accessories page (microsoft.com/en-us/surface/accessories/browse).



The free Windows 10 Creators Update will have all these upgrades

BY IAN PAUL

MICROSOFT SEES THE HoloLens and what Microsoft calls "mixed reality" as a big part of the company's future. We'll get our first major taste of that vision this spring when the next major update to Windows 10, dubbed the Creators Update, rolls out.

The new update appears targeted especially at Windows users between the ages of 12 and 24—who, Microsoft says, value creativity more highly than previous generations. That said, everyone else can come along for the ride, too, with new 3D creation tools for smartphones, PCs, the HoloLens, and virtual reality headsets. Gaming also gets a big nod in the Creators Update, with a built-in game broadcasting feature, custom gaming tournaments, and Dolby Atmos support for the Xbox One S.

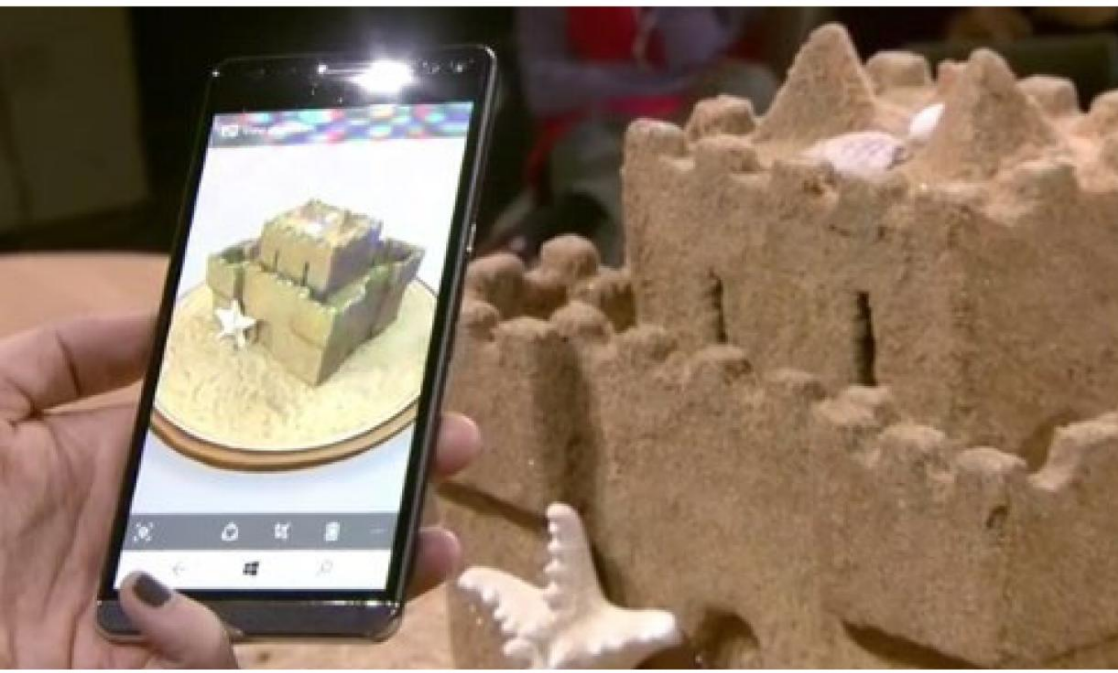
Here's a breakdown of what's coming.

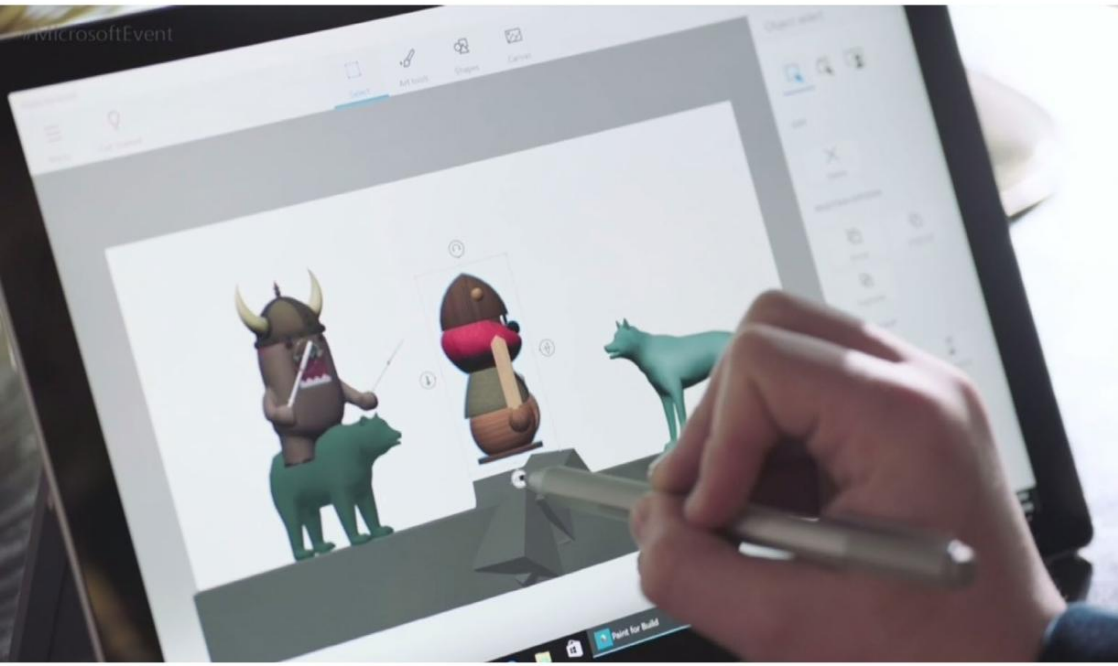
Windows Capture 3D

A new feature headed to smartphones and possibly other devices like tablets is Windows Capture 3D. This feature uses the device's camera to scan a physical object and turn it into a 3D digital one. All you have to do is point your camera at the real object and move around it, similar to how you'd slowly scan an area to create a panoramic photo.

Based on what we saw during Microsoft's demonstration, the images are a little on the cartoonish side. So don't count on creating photo-realistic images of your dog or a sand castle.

Microsoft plans to roll out the new feature (presumably as an app) to Windows 10 Mobile, as well as to other platforms such as Android and iOS.





Paint 3D

Once you've captured a 3D image with Microsoft's new mobile tool, you'll need a way to use it. That's where a new version of Microsoft Paint, called Paint 3D, comes in. If you follow the Windows rumor mill, then you've already seen leaked versions of Paint 3D in action.

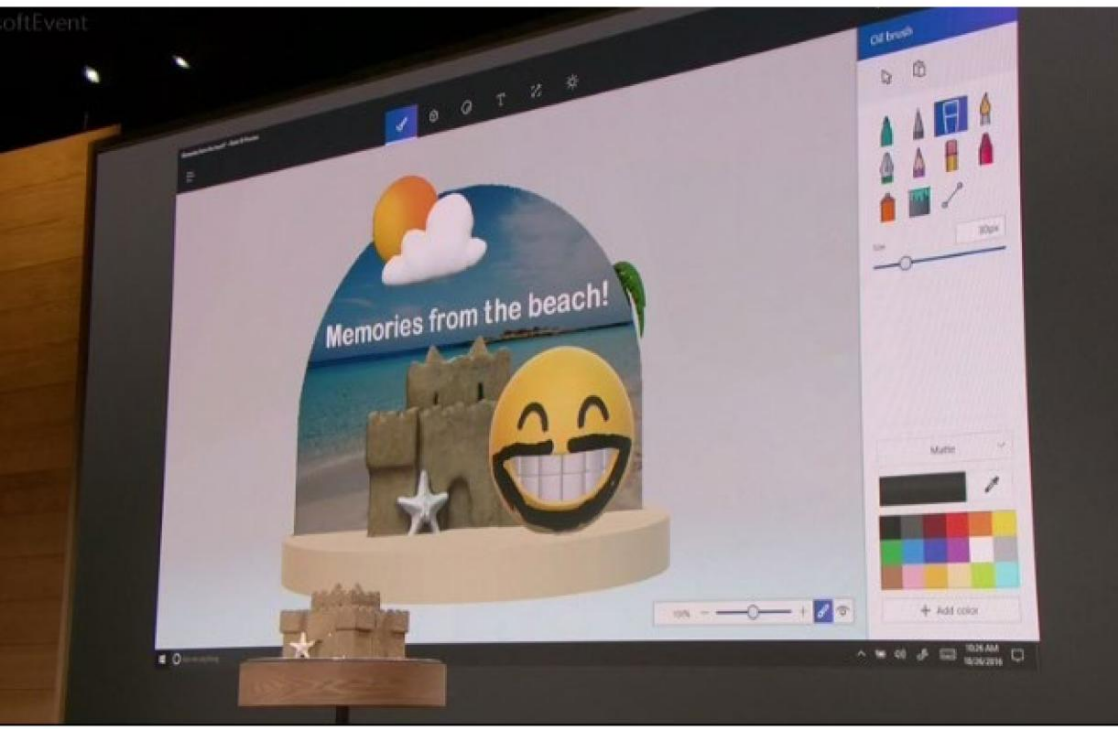
With this new built-in app, you can grab your 3D image captures and insert them into a regular image in Paint. With Paint 3D you could, for example, mix and match 3D and 2D elements to create an original image. Paint 3D will also have 3D emojis, the ability to add stickers as textures on 3D objects, or draw directly on 3D images with Paint's pen and brush tools. (Read our hands-on 3D Paint Preview on page 32.)

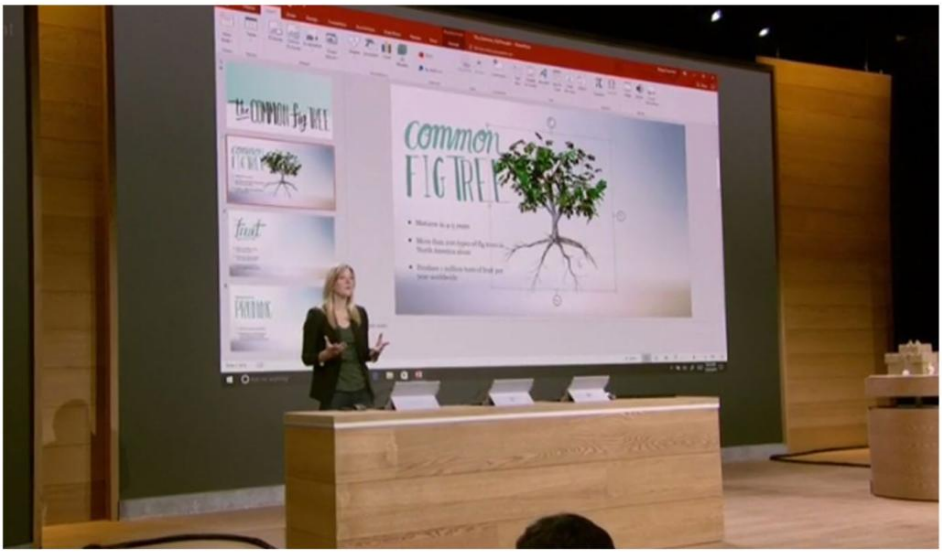
Remix 3D

If you get tired of scanning your own images, there's good news: Microsoft is building a new community—a site called Remix3D.com (remix3d.com) where you can basically grab the 3D equivalent of clip art. The community will feature items created using 3D modeling software Sketchup, as well as objects built in Microsoft-owned Minecraft.

Starting with the Creators Update, users will be able to export their creations from Minecraft and share them on Remix3D.com. There will also be the ability to seamlessly 3D-print your Minecraft creations to bring them into the real world.

Windows Insiders can sign up for the Remix3D preview right now.





Microsoft Office in 3D

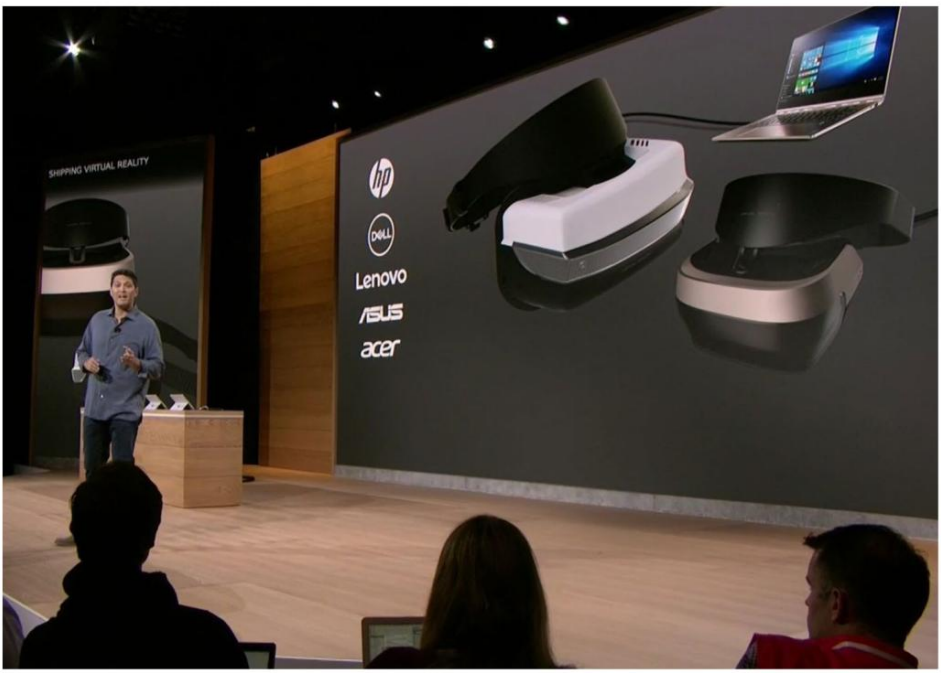
Windows 10's Creators Update will also let you get serious with 3D objects in Microsoft Office. It's not clear how many programs in the productivity suite are getting 3D integration, but Microsoft showed it off in PowerPoint, which is a natural fit for 3D imagery.

The presentation software will let you add 3D images, mix them with 2D elements (just like Paint 3D), and create fancy animated transitions from one slide to the next. In Microsoft's example, you could have a close-up of fruit hanging from a tree branch. For the transition to a new slide the 3D image of the tree spins and zooms out until you see the complete object.

VR accessories starting at $299

It appears Microsoft isn't going to let Google, Oculus, Samsung, and others run away with the virtual reality craze. The company says the Windows 10 Creators Update will bring "powerful and affordable VR" to everyone. Microsoft manufacturing partners including Acer, Asus, Dell, HP, and Lenovo will introduce VR headsets with six-degrees-of-freedom sensors similar to other headsets.

The key issue with these new accessories is that they are supposed to be much cheaper than Oculus or the HTC Vive, with prices starting at $299. The Rift and Vive are priced at $600 and $800, respectively, but there's no telling what the top price will be on the new Windows 10 accessories.



HoloLens

The HoloLens isn't ready for consumers yet. Nevertheless, the augmented reality device will get some interesting additions in the Creators Update.

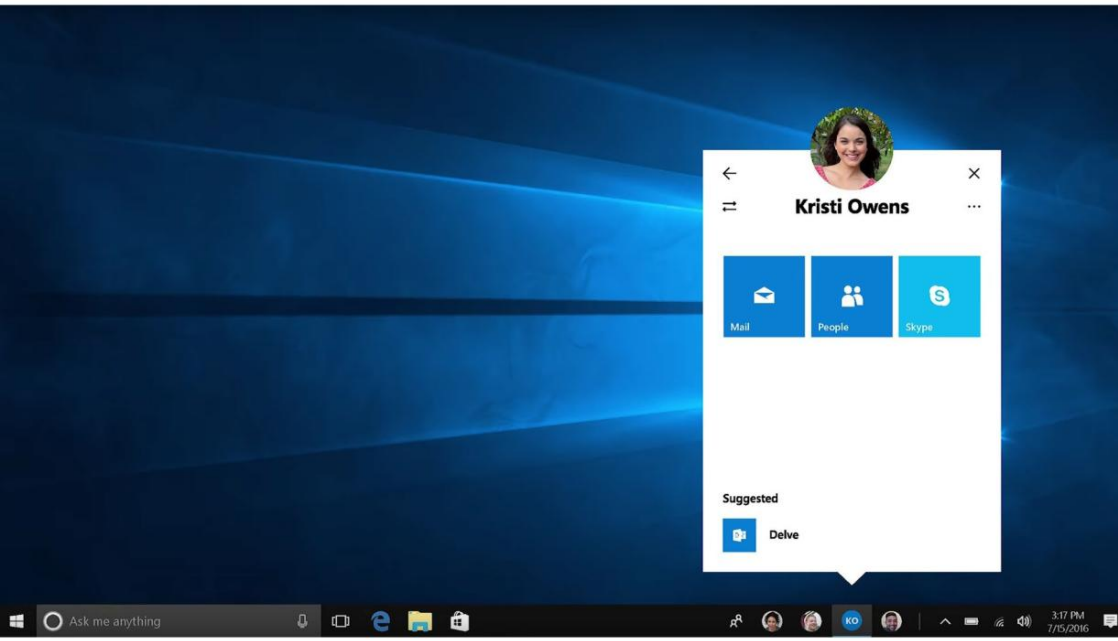
The most interesting is Edge functioning as "a portal for interacting with 3D digital content" in the HoloLens. Presumably, this will require some heavy lifting for websites that want to support it, but it looks promising.

Even Microsoft's rather mundane example was fascinating and ultra-futuristic. Using Edge in the Creators Update with the HoloLens, you could visit furniture site Houzz, select an item, and get a life size 3D representation of the object in your home. That way you could see how a bed might look in your kids' room, or how that new couch will fit in with the den's football fan motif.

Gaming, gaming, and 4K Blu-ray

Gaming and the phenomenon of watching gaming (such as e-sports matches and tournaments) is becoming huge. Windows 10 Creators Update will cater to gaming with a new one-click game streaming (go.pcworld.com/xboxstreaming) feature built into the Xbox Live Gamebar. The streaming feature will use Beam, a live game–streaming (go.pcworld.com/beamstreaming) service Microsoft acquired in August. Microsoft didn't say if the feature will also support Twitch or YouTube.

Microsoft will also expand Xbox Live's Arena mode, allowing users to create their own e-sports tournaments to match up against people in their Xbox Live network. Finally, the Xbox One S is getting Dolby Atmos support for improved audio when watching 4K Blu-ray. With 4K and HDR support already built into the Xbox One S, the console is shaping up to be a compelling entertainment unit for the living room.



My People

Microsoft wants to make people the center of your Windows experience with My People, a feature that borrows from Android and iOS. In the Creators Update, five important contacts will appear as profile images to the far right of your taskbar. You'll be able to drop files onto these contacts to immediately share items, or click on the contact to interact in a specific app like Mail, Skype, SMS, or Xbox Live.

Click Mail, and you'll get a customized inbox featuring only your interactions with that person. In addition, Microsoft will add a messaging feature called Shoulder Taps that lets "your people" send emoji and stickers that pop up immediately on the desktop.

Windows Store apps will also get My People built in, allowing you to quickly share files from the Photos app.

Watch the video at go.pcworld.com/surfacestudiovid

Hands-on: Microsoft's Surface Studio is a Windows PC for the Mac crowd

BY MARK HACHMAN

MICROSOFT'S SURFACE STUDIO charges aggressively into territory once held by Apple, combining an elegant design; a massive, lovely display; and an eye-popping price tag. We had a chance to try the company's first-ever desktop after it was announced (go.pcworld.com/surfacestudio) the morning of October 26. Here's what stood out during the demo.

Although the specs fall slightly short (go.pcworld.com/surfacestudio

specs) of state-of-the-art, everything felt extremely fast and responsive. The base $2,999 offering includes a 6th-generation (Skylake) Core i5, an Nvidia GeForce GTX 965M 2GB GPU, a 1TB hybrid drive, and 8GB of memory. At the highest end, the $4,199 model includes a 6th-gen Core i7, 32GB of memory, and a GTX980M GPU, along with 2TB of storage.

What I like most about the Surface Studio is how it pivots, literally, from a single-purpose workstation into an easel for artistic creation or sharing. A pair of hinges gracefully lifts the massive 28-inch, 4500x3000 PixelSense display from a nearly vertical position to about 20 degrees off the horizontal. The display itself offers Adobe sRGB and DCI-P3 color settings, individually color-calibrated. If there's any drawback, it's that the monitor itself lacks any other positioning feature. There's no way of raising it higher, save for propping it up with a book or stand.

Though it's designed for creativity, I found one pleasing productivity aspect: When in monitor mode, the display was large enough and detailed enough to allow for four snapped windows in each corner.

A fantastic display is what's going to grab your attention first.

The Surface Studio reclined, in "tablet mode." I found it comfortable to sketch upon, at least for the short periods I tried it.

Microsoft's Surface Studio mouse.

True, you can do this with any display attached to a Windows 10 machine. But the Studio display's vast real estate actually makes this practical, with little in the way of visual compromise.

The Surface Studio ships with a standard Surface Pen, plus an updated Microsoft Sculpt (go.pcworld.com/surfacemouse) mouse and keyboard, wrapped in Surface gray. I'm lukewarm on the peripherals (though you could certainly replace them with your own hardware). The mouse felt flat. I prefer a mouse with a smooth curve. I was also hoping for a keyboard a bit more like the Surface Book's, rather than the Chiclet-y feel of the Surface tablet's detachable keyboard. They both felt like flimsy cupholders on a luxury automobile.

The Dial, though, is intriguing. A $99 optional peripheral, the Dial augments the mouse and keyboard with quick, easily accessible

shortcuts packaged in something that looks remarkably like a hockey puck. I've detailed my impressions (go.pcworld.com/surfacedialhandson) in a separate article.

While the Studio doesn't include the modular functionality that was hinted at (go.pcworld.com/windowsfuture) in a patent filing, it does include a 5MP front-facing camera and a dual-mic array. Orally triggering Windows 10's Cortana assistant ("Hey, Cortana!") worked surprisingly well in the crowded demo room. I didn't try the camera.

I'm not sure I like Microsoft's decision to package its expansion ports inside the base. Microsoft essentially took its Surface Hub and tied it to a standard motherboard, encased it in plastic, and called it a day. The Studio puts four USB 3.0 ports inside the base, but points them toward the back, probably making it a pain to plug in anything. There's an SD card reader and a headphone jack—again, facing the rear. Unlike the Surface tablets, there's no USB port on the side of the monitor, which I rather miss. Bluetooth 4.0 and 802.11ac Wi-Fi complete the package.

The Studio is a lovely piece of hardware, and I can't wait to spend more time with it. But remember, it isn't necessarily for you or me. Microsoft is clearly aiming this at the creative community who normally would buy a Mac. I'll be interested to see how many actually make the jump.

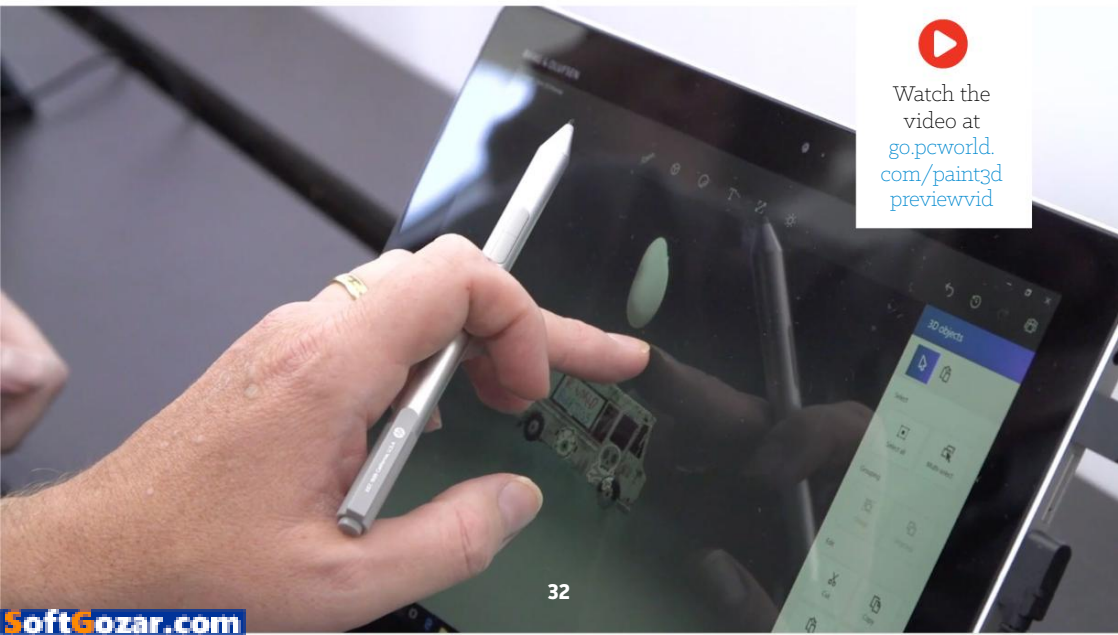
Microsoft says that front-facing ports would have interfered with the zero-gravity hinge. Knowing that doesn't make the back-facing ports any less obnoxious, though.

Hands-on: Paint 3D Preview remixes Paint for the HoloLens generation

BY MARK HACHMAN

FLOATING SOMEWHERE ON the Internet is a *PCWorld* burrito truck, thanks to the power of Microsoft's Paint 3D Preview. One version even has wings.

Virtually everyone who's used Windows is familiar with Paint, the default drawing program that's shipped with generations of Windows. Microsoft needed a bridge between Paint and a new generation of users that Microsoft wants to get hooked on the HoloLens and 3D printing, so it created the 3D Builder app in Windows 10. That app got no traction, so for its next attempt, Microsoft folded the features into the familiar Paint



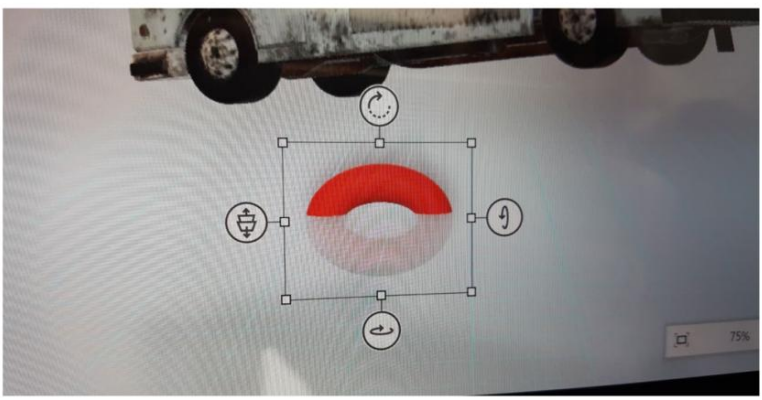
Watch the video at go.pcworld.com/paint3dpreviewvid

name, retooling the app for 3D—which Insiders can now download from the Windows 10 Store. Sure, you can use Paint for some 2D functions. But this is really about 3D content creation.

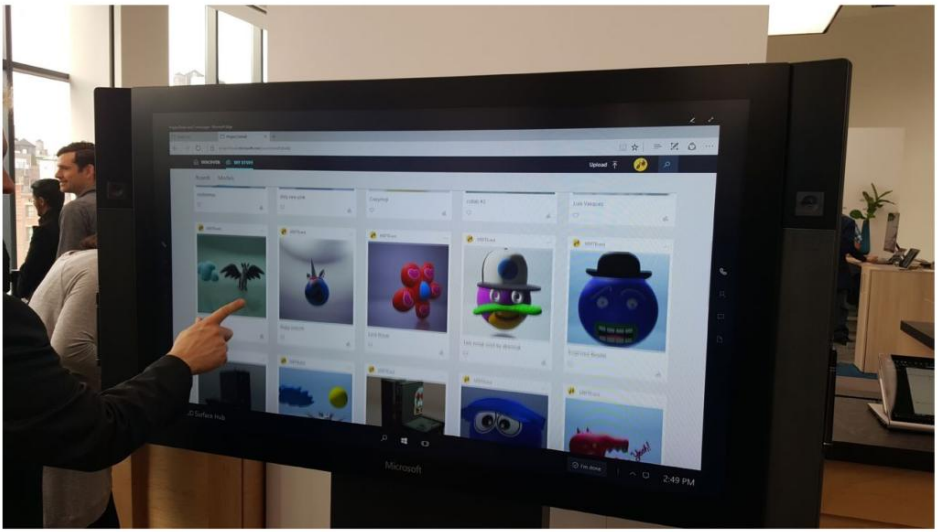
A (rather awful) remixed food truck constructed in Paint 3D Preview for Windows 10.

How to get started

Paint 3D is a UWP app, and unfortunately Microsoft chose to use a series of somewhat unintuitive icons to identify what Paint 3D can do: Paint, then some 3D-ish cube, then some sort of jellyfish thing, text, and a sun? You'll figure out the sequence: 2D object creation, 3D



Paint 3D Preview allows you to rotate 3D shapes around various axes, though the small icons may cause you to squint. Note that this object is "buried" in the floor.



Objects that you and others create can be shared online.

creation, illustration, and so on, but it's a bit daunting at the beginning.

The 3D cube icon is where things start getting interesting. Here, you'll have two modes: creating and viewing—that's the eyeball and paintbrush down at the lower right. If you start with a blank canvas, you'll want to create something new.

If you're familiar with the old Paint, you'll know that the app provides several templates for familiar shapes—circles, rectangles, and the like. Paint 3D does the same, but with faces, spheres, and more. Each 3D object is manipulable: You can resize it, rotate it, and more. If you can't predefine a 3D object, you can create one of your own.

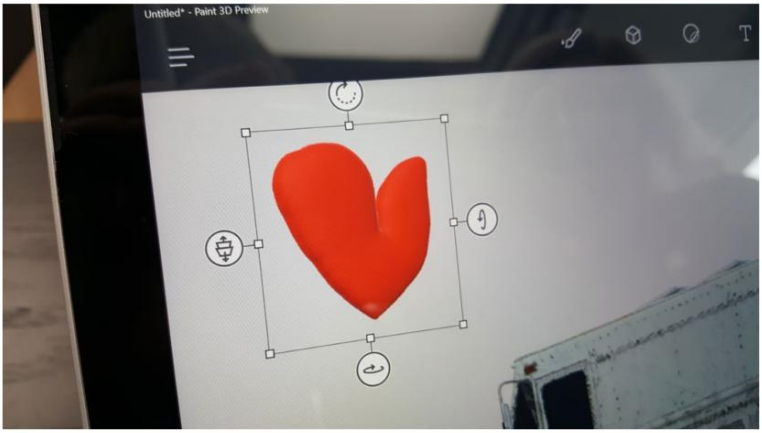
Let's assume, however, that you have my drawing ability—next to none. So there's a second way to create 3D objects: a special Microsoft community site called Remix3D.com (remix3d.com), where 3D designs can be uploaded, shared, and "remixed" or edited by others. It's not clear who owns the objects, but the Remix3D community may be designed similarly to the community of car liveries Microsoft provides for its Forza series of Xbox games, and the "remix" capabilities launched with the Sway app.

Let's paint in 3D!

But wait, there's more—there's a third way to create 3D objects.

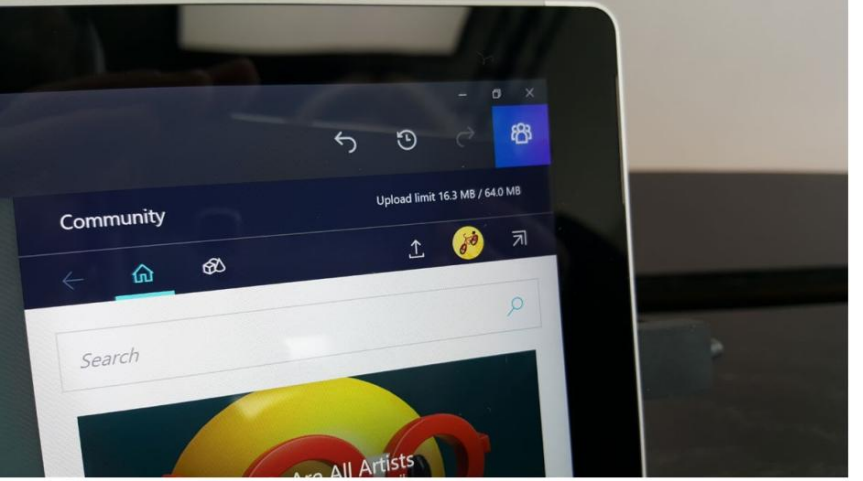
Paint 3D allows you to doodle a 2D object, and then puff it up to 3D. Think of a 2D shape, and then something like an identical throw pillow stuffed with 3D goodness. The resulting object can be uniformly deformed, but I didn't see an option to lasso a point or region and yank it into a new shape. It's actually kind of neat, though some 2D objects don't necessarily translate that well into 3D.

In general, Paint 3D looked quite polished for a preview app. One glitch I noticed deals with 3D text, the fourth option in the icon bar



Doodle a 2D shape, and you can "puff" it out to a 3D object.

Go ahead and apply stickers to your creation. They will mold themselves to your 3D object when you "stamp" them on.



Share objects when you're done. Note that there's a limit to how large that single object can be in terms of file size.

along the top. Text appears in a classic Paint window. But when I tried to type in virtual text, the letters were invisible until I clicked outside the window, which makes it relatively useless for editing.

You'll also notice that objects appear in a virtual room, like a diorama. The borders of the room aren't sharply defined, allowing effects like "burying" an object partway into the floor—that's a feature, not a bug. By defining an object in 3D space behind another, you can also set up occlusion and other 3D effects.

With the 3D content creation out of the way, the other options are to decorate your objects. You can color them, of course, or apply a short list of custom stickers. The final option controls how your virtual objects are lit: You can control the background color and the direction of the lighting, though I didn't see a control to change the colors of the virtual lighting itself.

When you're done, way up in the upper right-hand corner is the Share charm, which allows you to publish your work to Facebook, Remix3D, or other social media. Feel free to add tags, a description, and the like. Eventually, you'll be able to view your creations as HoloLens holograms, though without a handy HoloLens.

In my mind, Microsoft made a smart move tying community creations to Paint 3D. Doing so preserves the wonder of it all without a great deal of effort. And that's the whole point.

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Dell's futuristic Smart Desk PC will challenge Microsoft's Surface Studio

BY IAN PAUL

DELL'S GETTING READY to take on Microsoft's Surface Studio (go.pcworld.com/surfacestudio) in 2017.

During a promotional video (youtu.be/Y5E_dGW2DFY) at Adobe Max, Dell revealed a Surface Studio–like PC aimed at creative professionals—but don't call it a copycat device. HP introduced the first creative-oriented PC (go.pcworld.com/hpsprouthandson), the

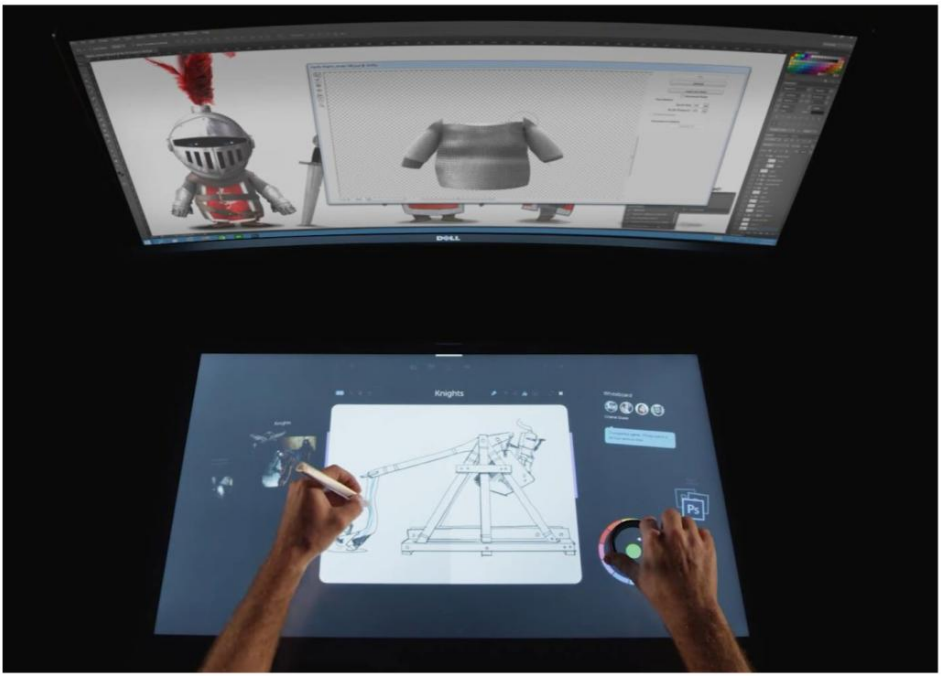
Sprout, two years ago, and Dell says it's been working on (go.pcworld.com/smartdeskproto) what it calls the Dell Smart Desk (working title) (go.pcworld.com/dellsmartdesk) for about three years. Shortly after Adobe Max, the company took to Twitter (twitter.com/Dell/status/793898480582422528) to say the Smart Desk will be formally announced during the Consumer Electronics Show (pcworld.com/category/ces) in January.

The Smart Desk actually appears a bit more complicated than the Surface Studio. Microsoft's new enterprise product is essentially a massive tablet that can sit at a comfortable angle for touch interaction for long periods. The Dell Smart Desk, meanwhile, is a combination of a Surface Studio–like tablet with a regular computer monitor. Dell's version even has its own rendition of the Surface Dial (go.pcworld.com/surfacedialpuck) that has also been under development since 2014. HP's Sprout, by contrast, doesn't require any hockey-puck-like controls, but it includes a scanner for making 3D images and uses a projector and special work surface to manipulate images right on your desk.

Dell's Smart Desk displays the critical interactive parts of an application on the tablet portion of the device, while the results of that work are on the regular display.

If you were looking at a map in Street View mode, for example, the actual map would be on the tablet, while the street view photos

Dell's current vision for its version of the Surface Dial.



An early version of the Dell Smart Desk.

would be on the computer screen. A composer could have a keyboard and mixing tools in front of them on the tablet, while the new composition's various tracks would be on the monitor.

There's no word on the specs of the Smart Desk, an official name, or even a price. All we know is that Dell will show it off at CES and will announce more about the Smart Desk at that time.

The story behind the story: Dell's Smart Desk may be a three-year project, but it's no surprise the device is being teased now. With Microsoft announcing the Surface Studio (see our hands-on review on page 28) and Windows 10 Creators Update (story on page 19), this is a perfect time to promote what will no doubt be a pricey investment. In fact, it wouldn't be surprising to see a lot of PC vendors focused on the creative professional during CES given the features and capabilities rolling out in the next major update to Windows 10.

Go PC! 5 killer MacBook Pro alternatives for disappointed Apple fans

BY BRAD CHACOS

MehBook "Pro"

The immediate reaction to Apple's long-overdue MacBook Pro overhaul (go.pcworld.com/mcbkprotouchhandson) seems mixed, to say the least. For every excited reaction to the laptop's adaptive Touch Bar keys, we see people lamenting the lack of ports (go.pcworld.com/7techkilledinmcbk2016) that professional users actually need, the lack of a 32GB memory option, the lack of an SD card slot, and the lack of, well, pretty much any "pro" features in the entry-level MacBook Pro model (which still costs $1,500 and up).

Fear not: If "Pro" is more than a mere buzzword to you, there's a veritable cornucopia of attractive, yet powerful, PC laptops just waiting to scratch your itch. And Windows itself is bending over backward to cater to professionals, recently adding in tons of power tools—even Linux's beloved Bash (go.pcworld.com/bashhowto)!—with a new Windows 10 Creators Update (go.pcworld.com/win10creatorsupdate) coming early next year. There's never been a better time for dedicated Mac users to make the switch.

Rather than focus on purely enterprise notebooks, these suggestions mix firepower and flexibility with sleek design and premium features—just like the MacBook Pro is supposed to do. For even more options, be sure to check out *PCWorld*'s list of the best PC laptops around (go.pcworld.com/bestlaptops2016).

Dell XPS 13

Let's start with *PCWorld*'s flat-out favorite Ultrabook (go.pcworld.com/bestlaptops2016), the Dell XPS 13, which has a substantially smaller footprint than the MacBook Air 13 thanks partially to its borderless InfinityEdge display. It's freaking small.

Sadly, the Dell XPS 13's memory options top out at 16GB, just like the new MacBook Pro. But in every other way it's a superior professional laptop. On the exterior, Dell's Ultrabook packs multiple USB 3.0 and 3.1 ports, Thunderbolt 3.0, an SD card slot, and even a Noble lock slot for security. Inside, the Dell XPS 13 packs more potent hardware than Apple's laptop thanks to the inclusion of current-gen (not last-gen, cough) Intel Core processors and a blazing-fast NVMe SSD.

Check out our review of last year's Dell XPS (go.pcworld.com/skylakexps13) for a general overview, and our Kaby Lake CPU review (go.pcworld.com/kabylakerv) for a sneak peek at the performance of the new version with Intel's latest chip. Pricing for Dell XPS 13 models with a Core i5 or better processor start at $1,050 on Dell's website (dell.com/us/business/p/xps-13-9360-laptop/pd).

Microsoft Surface Book

If you think the MacBook Pro's Touch Bar is nifty, wait until you check out Microsoft's Surface Book (go.pcworld.com/surfacebookrev), a sleekly designed piece of kit packing a detachable, fully touch-enabled high-resolution display with support for the included Surface Pen Stylus.

The Surface Book packs performance comparable to the new MacBook Pro, with a new "Performance" version announced the day before Apple's event pushing things even further with twice the graphics power of the original. You'll find a pair of USB 3.0 ports, a Mini DisplayPort, a full-sized SD card reader, support for Microsoft's nifty new Surface Dial accessory, and a Surface Connect connection so you can slip the laptop into the Surface Dock (go.pcworld.com/surfacedockbuy). What's more, the Surface Book offers enterprise-ready features like TPM encryption and biometric authentication via Windows Hello. The only real bummer: Like the other options discussed so far, the Surface Book maxes out at 16GB of RAM.

The Surface Book starts at $1,500 on Microsoft's website and increases in price as you add more features.

What's more, if you act now you can take advantage of Microsoft's trade-in deal (go.pcworld.com/macsurfacetrade), which lets Mac users exchange an old MacBook for up to $650 off a new Surface device.

HP Spectre x360

The HP Spectre x360 (go.pcworld.com/hpspectre-x360) stands as *PCWorld*'s favorite 2-in-1 laptop, with a screen that folds back to convert the device into an impromptu tablet, and a new version was just announced that adds Intel's new 7th-generation Kaby Lake chip (the new MacBook Pro uses older 6th-gen processors), speedy NVMe SSD options, and Thunderbolt 3.0 support.

The Spectre x360 packs a touch-enabled display, a sleek sub-3 pound chassis carved from CNC'd aluminum, and a webcam that supports Windows Hello biometric authentication. Sadly, its ports are limited to USB-C connections—just like the MacBook Pro—but the Spectre x360 offers more potent internals and a longer rated battery life, at 12 hours compared to the MacBook Pro's 10. Great audio and a luxurious-for-the-segment keyboard round out the 2-in-1's appeal.

Model's with a Core i5 processor start at $950 on HP's website (go.pcworld.com/hpspectrex360), with a loadout comparable to the entry-level MacBook Pro for $550 less.

Razer Blade Stealth 13-in

Speaking of the entry-level MacBook Pro (which is really a replacement for the MacBook Air go.pcworld.com/nomacbookair), if you don't need massive amounts of RAM and storage space, check out Razer's Blade Stealth laptop (go.pcworld.com/razerbladestealthrev), which gives the XPS 13 stiff competition for *PCWorld*'s favorite Ultrabook. Razer's sleek black aesthetic largely mimics the MacBook Pro's design cues, but fancies things up with 4K display options, gorgeous IGZO screen technology, and a wonderful keyboard with per-key customizable RGB backlighting.

Like most of the other PC laptops discussed here, Razer's Blade Stealth was recently upgraded to include Intel's new 7th-generation processors and blazing-fast PCIe M.2 SSDs. (PC makers don't take four years to upgrade their hardware.) It also packs another nifty trick up its sleeve: Compatibility with Razer's $500 Core graphics dock (razerzone.com/store/razer-core), which allows you to use the power of full-blown desktop graphics cards when connected to the laptop. That helps keep the Blade Stealth slim enough for travel, but potent when you need extra graphics oomph.

Pricing for the Razer Blade Stealth starts at $1,000 for the base model on Razer's website (razerzone.com/store/razer-blade-stealth), with configurations topping out at the $2,000 4K version.

Razer Blade Pro

But what if you need more mobile firepower, not MacBook Pro-like compromise? Witness the recently revamped 17-inch Razer Blade Pro (go.pcworld.com/razerbladepro4k). It's thicker and heavier than the other laptops listed here, but still manages to keep a MacBook-esque form factor in a sub-1-inch chassis, and it puts that extra space to good use.

Razer's touting the Razer Blade Pro as a desktop in a laptop body, and it ain't lying. This beast packs options for up to 32GB of RAM, 6th-gen quad-core Core i7 processors that can boost to up to 3.5GHz, 2TB of PCI-E SSDs configured in RAID 0, and god-tier GTX 1080 graphics paired with a 4K IGZO display featuring Nvidia's G-Sync screen-smoothing technology and 100 percent Adobe color-space coverage. As if that wasn't enough, the Razer Blade Pro packs a full backlit RGB mechanical keyboard into its chassis and a full array of port options, including three USB 3.0 ports, HDMI 2.0, ethernet, an SD card reader, Thunderbolt 3/USB-C, and even a Kensington lock slot.

Hot *damn*.

Sadly, the new Razer Blade Pro hasn't quite hit the streets just yet, but you can sign up on Razer's website (razerzone.com/gaming-systems/razer-blade-pro) to be notified of its arrival. Keep your checkbook handy, because this monster starts at a cool $3,700.

Microsoft seems ready to give up on Windows phones, if not Windows 10 Mobile

BY MARK HACHMAN

THE FUTURE OF Windows phones…might not be phones?

Rumors and hopes for a category-defining Surface phone were not satisfied at Microsoft's press event in October. The company didn't even mention Windows 10 Mobile. With the collective market share of Windows phones stagnant at about 1 percent, customers and partners have to wonder why anyone should bother investing in Microsoft's mobile strategy.

In an interview with ZDnet's Mary Jo Foley, Microsoft executive vice

president of Windows and devices Terry Myerson was asked just that. But instead of committing wholeheartedly to Windows phones—or declaring that product line dead—Myerson tried a different tack: obscurity.

"Technically, there are really two things that are unique about Windows Mobile," Myerson replied, when asked why Microsoft was, in Foley's words, "wasting time" upgrading Windows 10 Mobile. "One is cellular connectivity and the other one is the ARM processors that are there."

"So we're going to continue to invest in ARM and cellular," Myerson continued. "And while I'm not saying what type of device, I think we'll see devices there, Windows devices, that use ARM chips. I think we'll see devices that have cellular connectivity."

But instead of committing wholeheartedly to Windows phones—or declaring that product line dead—Myerson tried a different tack: obscurity.

Devices, not phones

The word Myerson did not use, of course, is "phones," leading some to speculate that any forthcoming Surface "phone" would instead be a tablet—perhaps an ARM-based tablet, perhaps one with cellular connectivity, but not a phone.

To recap: Existing Windows phones run on ARM processors from Qualcomm and others, using Windows 10 Mobile. Windows tablets do not. At one point, of course, they did: The original Surface ran on Windows RT, a version of Windows designed for ARM chips. But consumers soundly rejected the Windows RT tablets, and Microsoft reportedly scrapped a smaller Surface Mini (go.pcworld.com/surfacemini) that may or may not have run Surface RT.

Instead, Microsoft doubled down on the Surface Pro 3, which went on to become the Windows tablet that helped define Surface and Windows tablets in general. Microsoft encouraged development on what it saw to be a more successful implementation of Windows 10 running on top of ARM: Windows phones.

Currently we have a pair of Windows 10 flagship phones, each

manufactured by Microsoft PC partners: the Acer Liquid Jade Primo (go.pcworld.com/acerliquidjade) and the HP Elite x3 (go.pcworld.com/hpelitex3-rev) . But Microsoft appears ready to flip-flop again.

Windows Mobile: Part of the Windows 10 train

And why not, Myerson seems to be saying: "When you stop investing in these things, it's super hard, super, super hard to restart," Myerson said. "At Microsoft we have a few of those examples where we stopped. Sometimes, when you're investing into growth, it's easier, but when you're investing for technical strategy or things like that, sometimes people can question it—like you're doing right now."

Some observers are probably wondering why it's more difficult for Microsoft to halt development of Windows 10 Mobile than its own Lumia hardware, or why ARM and cellular connectivity are considered to be differentiating features for Microsoft alone—and not, you know, every phone ever made. Why didn't Myerson highlight Continuum, Microsoft's phone-as-PC argument? Or virtualized Win32 apps, as HP's Workspace uses? He's a straightforward man, though, so it's most likely he's simply answering the question in the way Microsoft is now framing the problem.

Terry Myerson, the Executive Vice President of Microsoft's Windows and devices group, speaks at a company event in New York City on October 26, 2016.

Give Myerson a little credit, though. How often are smartphones used for talking? As screen sizes balloon, phones are evolving more into data-driven messaging and computing devices than simple squawk boxes.

No one believes that the cratering of Microsoft's phone business was all part of some master plan to usher in the next big thing. But the door's still open for something interesting to emerge from Microsoft's mobile business. If Myerson's to be believed, however, it may not be a phone.

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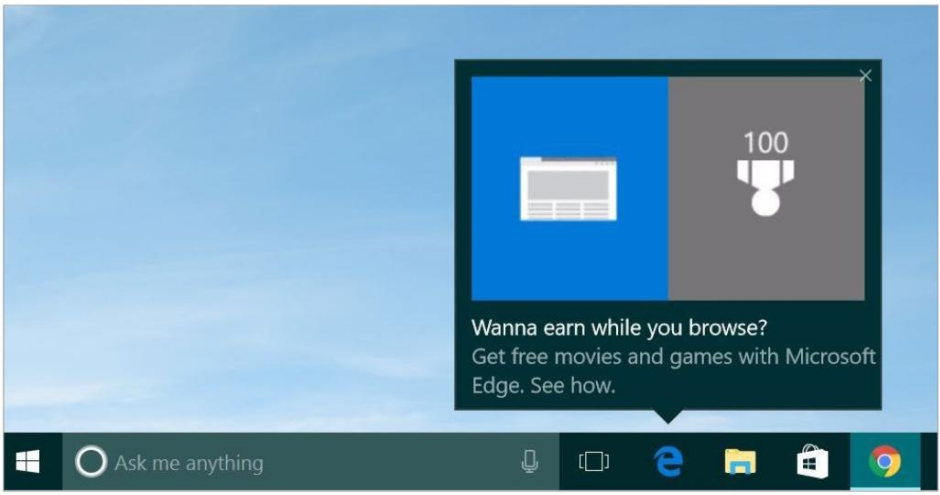


A popup ad that promotes Windows 10's Edge browser and Bing Rewards.

Here we go again: Microsoft's popping up ads from the Windows 10 taskbar

Can't we just put an end to this already?

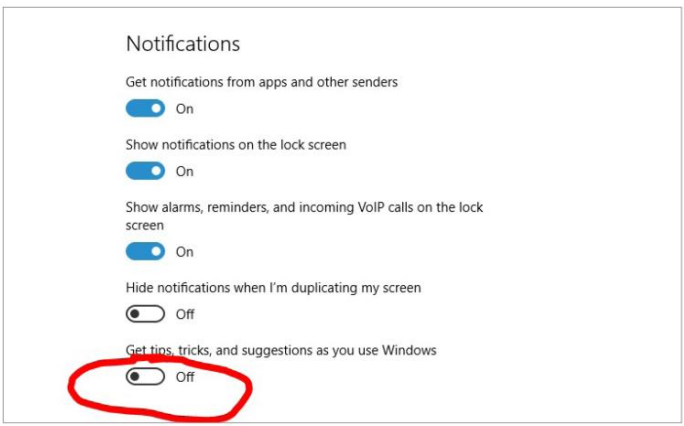
BY MARK HACHMAN

When Microsoft's Windows 10 deadline passed, many heaved a sigh of relief, thinking that Microsoft's obnoxious popup reminders had finally been laid to rest.

Surprise! Microsoft's at it again, reminding users to sign up for Microsoft Rewards (formerly Bing Rewards go.pcworld.com/mcrsftrewards) by using Edge, Windows 10's built-in browser. My colleague Brad Chacos was hit by the ad on the previous page after hours, reported it, and immediately erased Edge from his taskbar.

Here's what we know: The popup doesn't seem to appear if you use Edge frequently (Brad does not). Personally, I've never experienced a similar ad, though I use Edge as well as Microsoft Rewards, meaning there's no need for such an ad to appear.

A notification here, a suggestion there: Microsoft's gently slipped in promotions for Office as well as its third-party apps off and on since Windows 10 was launched, and then sneakily reset those options once the Anniversary Update launched last summer. (Here's a list to turn off those Windows 10 ads (go.pcworld.com/stopwin10ads) if you're still seeing them.)



To prevent seeing the Edge popup, Microsoft says to go to Settings > System > Notifications & Actions and make sure this toggle is "off".

But here's the problem. Brad turned off his ad settings; the Anniversary Update reinstated them. Brad says he turned off the ad settings again—and once again, Microsoft reinstated them. (Editor's Note: That might be the issue. Recently, Microsoft told us if you want

to eliminate the Edge popup, make sure that the suggestions setting is toggled off, as per the graphic. Brad Chacos later confirmed his suggestions setting was still enabled.)

Please, not this stuff again

And that's not the only Edge promo that Microsoft is slipping in, either. (go.pcworld.com/edgepromo).

Maybe an ad isn't the worst thing in the world. But we can all remember the mind-warping rage Microsoft's Windows 10 "reminders" engendered: first a "Recommended" update (go.pcworld.com/recupdate), then repeated nagware, then an outrageous reversal of conventional UI that made clicking the red-x Close button to escape the upgrade (go.pcworld.com/escapewin10update) an opt-in to kick off the upgrade process itself. Say what you will about the Windows 10 OS and its nosy assistant, Cortana—that's entirely different from Microsoft's tactics for invading your desktop to remind you to try out a new service.

Microsoft's mission to promote Edge

I personally like Bing and Bing Rewards: if you're going to search the web, you may as well let Microsoft buy you a cup of coffee. With enough activity, you can pretty much pay for a year of Xbox Live Gold.

I also think Microsoft Edge was one of the most underrated features in Windows 10's Anniversary Update (go.pcworld.com/win10underrated). It was simply awful when Windows 10 launched but has

steadily improved since then. Other users haven't been nearly so patient, leaving both of Microsoft's browsers, Internet Explorer and Edge, in droves—by Computerworld's calculations, a whopping 300 million or so users since January. That's a third of a billion users who have chosen Chrome, Firefox, Opera, or one of several other smaller browsers instead.

I'm on record as someone who called on Microsoft to promote its new Office features (go.pcworld.com/office2016features)—in part, to justify users' paying a monthly fee for Office 365. If Microsoft hadn't so egregiously crossed the line with its upgrade reminders, I'm not sure how many users would care.

Turning on ads after a user has turned them off, repeatedly: Come on.

But there's a middle ground between promoting new features and respecting users. Microsoft's tried a number of tactics to bring users back to the Edge fold. In addition to the carrot of Microsoft/Bing Rewards, it's tied Cortana to Bing and the Edge browser. It's slowly added the extensions (go.pcworld.com/edgeextension) other browsers have featured for years. It's also tried gimmicky features like the ability to ink a Web page (go.pcworld.com/howtoedge), which probably haven't done much to win fans.

Turning on ads after a user has turned them off, repeatedly: Come on. There's always been some part of Microsoft that can't resist crossing the line: Think "Scroogled (go.pcworld.com/scroogled)," or "astroturfing (go.pcworld.com/astroturfing)." Privately, other Microsoft employees have said they're embarrassed by it.

It may seem a bit petty to get up in arms about a small Edge promotion. But we've gone down this road before, and there's a lot of us that want to ensure we never do again.

Google Drive dumps Windows XP and Vista, now what?

BY IAN PAUL

STRIKE ANOTHER PROGRAM down for Windows XP (and Vista) fans. Google recently announced that the Google Drive desktop utility would cease support for Windows XP, Vista, and Server 2003 beginning January 1, 2017. This is the second major desktop-cloud sync program to dump older versions of Windows after Dropbox did so in April.

With Google Drive going away, what's an XP (or Vista) fan to do? Here are some solutions.

Just keep on, keepin' on

Unlike Dropbox, Google isn't turning off Google Drive for the desktop. As long as you have the utility up and running on an XP and Vista computer before January 1, 2017 you can continue to use it.

Even though it will continue to work, Google says the program "will not be actively tested and maintained." That means if a serious

security flaw is discovered the XP- and Vista-supporting versions of Google Drive will not be patched, leaving you at risk of being hacked. Of course, if you're still running Windows XP, which also isn't being updated, then the threat of another critical flaw running on your system probably isn't worrying you—even though it should.

Use the website

As with Dropbox, you can continue using the website version of Google Drive. As long as your browser continues to support the technology and features that Google uses on its website, you should be good to go. Google Drive began as a web-only service with no desktop component (that came along in 2012), so in some ways it will be like going back in time—kind of like running an XP machine. Sorry, couldn't resist.

Google Drive began as a web-only service with no desktop component (that came along in 2012), so in some ways it will be like going back in time—kind of like running an XP machine. Sorry, couldn't resist.

Find another service or upgrade to Windows 10

If using a desktop-cloud sync program integrated with Windows Explorer is a must, then XP and Vista users will have to look elsewhere, such as the paid service Sugar Sync.

The reality, however, is that other sync services will eventually cease support for Windows XP, too. Like it or not, if you want to continue using modern versions of cloud sync you'll have to upgrade to a Windows 10 machine at some point.

If you're waiting for your PC to completely give up the ghost before getting a new one, then make sure you download Google Drive before January 1.

Another 40 million people bolt from Microsoft's browsers as mass exodus continues

BY GREGG KEIZER

MICROSOFT'S BROWSERS HEMORRHAGED another 40 million users last month, according to analytics vendor Net Applications, pushing the year's total number of deserters near the one third of a billion mark.

Net Applications pegged the combined user share of Internet Explorer (IE) and Edge at 28.4% for October, a fall of 2.3 percentage points. The month's decline was the second-largest ever for Microsoft's browsers, behind only May's plummet of 2.7 points.

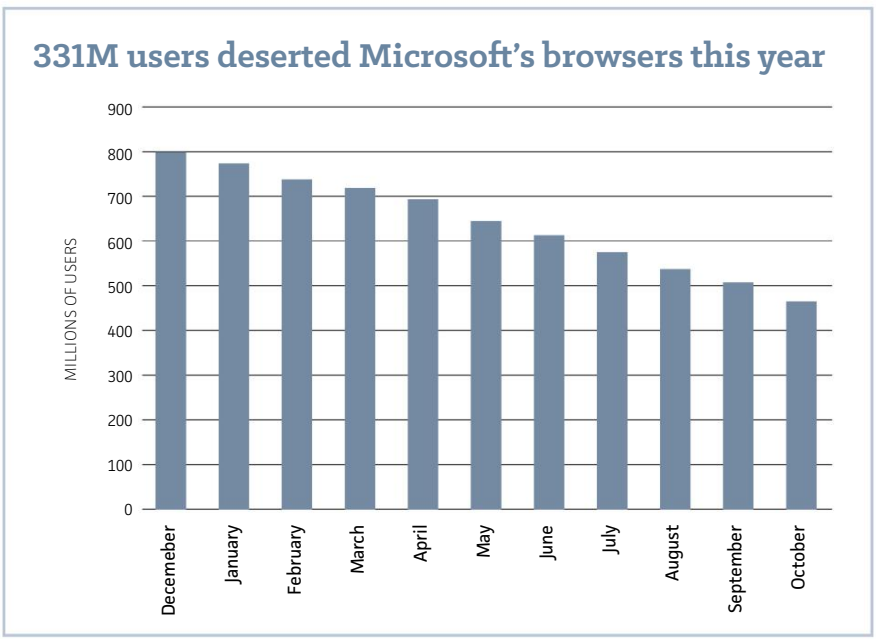
Unlike in most previous months, Microsoft's bane was not Google's boon, but instead Mozilla's. Firefox's user share jumped nearly 2

percentage points, to 11.1%. Atop an almost-as-large increase in September, Mozilla's Firefox has stepped away from a precipice, and in two months recovered almost all the losses it incurred during the past year.

IE has shed 20.2 percentage points in 2016, and the fall shows no sign of stopping, or even slowing. In the last six months, four have recorded declines of 2 points or more, twice the number of the six months before that.

If declines continue at the rate of the last 12 months, IE + Edge will drop below the 25% mark in December, and under 20% by March, *Computerworld* calculated.

Although most Microsoft deserters have ended up on Google's Chrome, the pace of the latter's gains has slowed the last two months. Chrome added six-tenths of a percentage point to its share in October,



More than 331 million users deserted Microsoft's browsers this year, 40 million just last month. How low can IE (and Edge) go?

just over a third of the average over the last 12 months. Chrome accounted for 55% of all browsers for October.

Firefox's very large increases in September and again in October were puzzling. October's was the largest single-month boost to Firefox's user share in *Computerworld*'s tracking, which began in January 2005. One possible explanation: Net Applications' measurement may represent a recalibration of Firefox's performance, and thus a rejection of the steady decline it previously portrayed for the last year.

Since January 1, 2016, IE and Edge have lost about 331 million users.

Using Net Applications' data for browser and operating system user share, as well as Microsoft's claim that about 1.5 billion PCs run Windows worldwide, *Computerworld* put the collapse of IE (and Edge's inability to make up those losses) in terms of millions of users.

At the end of October, IE and Edge were being run by approximately 466 million users, down 40 million from September's 506 million. Since January 1, 2016, IE and Edge have lost about 331 million users.

To put that in perspective, Net Applications' data showed that Windows 10 powered approximately 371 million PCs in October.

Mozilla promises a next-gen Firefox engine that will deliver huge improvements

BY MARK HACHMAN

MOZILLA'S FIREFOX CHIEF promised massive leaps in the web browser's performance via "Project Quantum," an entirely new web engine that will power Firefox beginning in 2017.

Quantum, according to David Bryant, the head of platform engineering at Mozilla, will take full advantage of modern PC and mobile hardware, exploiting parallelism to run processes across multiple cores and the GPU. Quantum will be the code at the core of the browser, responsible for its overall performance.

"We are striving for performance gains from Quantum that will be so noticeable that your entire web experience will feel different," Bryant wrote in a blog post. "Pages will load faster, and scrolling will be silky smooth. Animations and interactive apps will respond instantly, and be able to handle more intensive content while holding consistent frame rates. And the content most important to you will automatically get the highest priority, focusing processing power where you need it the most."

Why this matters: Bold words, certainly. But necessary, given that Firefox's user base has been gently waning for months—down from

almost 12 percent in 2014 to 6.36 percent in September—as rival browsers pick off users with new features. Obviously, web performance is dependent on several factors—total and available bandwidth, other tasks running on the PC, and so on—but a snappy web experience is worth it, no matter who the browser vendor is.

Under the hood: Electrolysis, Gecko, and Rust

Mozilla has already begun pushing out a multi-process browsing experience to some Firefox users over the past few months, known as Electrolysis. Electrolysis, however, is a security-oriented approach, designed to isolate processes and prevent them from crashing or compromising the browser. Quantum will extend that approach and deliver performance benefits, Bryant wrote, both for traditional browsing as well as for web apps.

Mozilla has already begun pushing out a multi-process browsing experience to some Firefox users over the past few months, known as Electrolysis.

Quantum "starts with" Gecko, the traditional web engine that has powered Firefox since 2003, and replaces major engine components that will benefit most from parallelization, or from offloading to the GPU, Bryant wrote. It will also incorporate parts of Servo, an independent, community-based web engine sponsored by Mozilla, he added. A number of components are also written in Rust, a systems programming language that Bryant described as "blazing fast."

Mozilla's key market is still the PC, and Windows, though Quantum will be added to the Firefox browsers for Android, the Apple Mac, and Linux as well. Eventually, Quantum may come to iOS, though that's apparently not the priority. The first Quantum code will begin hitting in 2017, Bryant wrote, and its sounds like a fully baked Quantum-powered version of Firefox is due by the end of next year.

REVIEWS & RATINGS

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Surface Book i7: Still unique and still blazing fast

BY GORDON MAH UNG

It's always been difficult trying to find the right category for Microsoft's hybrid tablet/laptop Surface Book. And now with the new Surface Book i7 in hand, it's even harder to figure out just what square hole to put this round peg into.

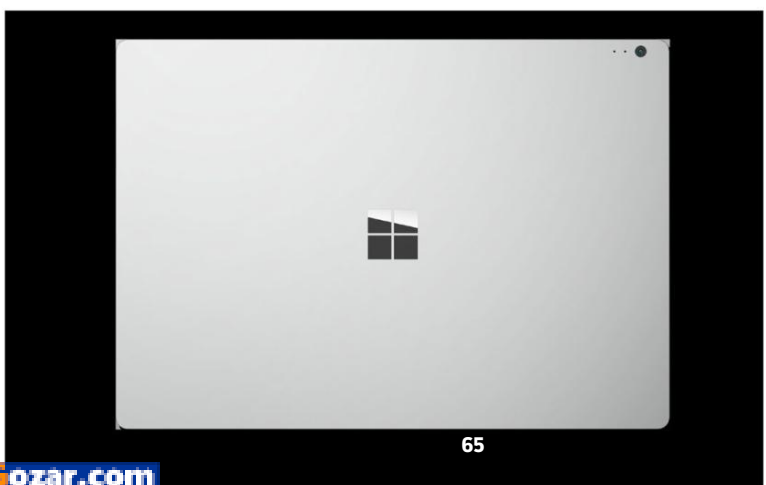
Before we get too far into the review, let me say that the Surface Book i7 is incredibly fast for a laptop in its class, offering no less than *twice* the performance of the original Surface Book, which itself outstripped all others in its day. Even better, it has stupidly long battery life that bests *all* the laptops we've tested.

Done. Fini. Move along, right? Well, not quite. The world isn't the same as it was a year ago, and the Surface Book i7's competitors have been hard at work too, and there are aspects of Microsoft's hybrid device that aren't perfect.

What it is

If you're not up on current events, the Surface Book i7 is the second iteration of Microsoft's "convertible" laptop. The top half is a beautifully proportioned 13.5-inch tablet with a PixelSense screen that has touch and pen support.

The keyboard base (aka the Performance Base) is home to a discrete graphics chip, which takes the Surface Book's performance beyond that of any other laptop in its class.



The Surface Book i7 is hard to define but still pretty damned fast.

Bam. Dat hinge. Love it or hate it, it's still there in the latest Surface Book i7. In fact, it looks unchanged from last year's (above).

The two sides are held together with that same crazy hinge found on the first Surface Book. There were rumors Microsoft would give up on its "dynamic fulcrum hinge" and eliminate the gap it creates, but nah, it's still there and remains one of the most prominent features of the Surface Book i7.

The old and the new of it

The Surface Book's tablet looks identical to the previous version (go.pcworld.com/surfacebookrev). In fact, from what I can tell, nothing has changed externally. The PixelSense screen is the same IPS panel with 3000x2000 resolution. Behind the screen there's an Intel dual-core 6th-gen Skylake Core i7-6600U. It's paired with 8GB and 16GB LPDDR3 options, as well as an SSD from 256GB to 1TB. (We received a model with 16GB of RAM and a 1TB SSD, which can be found on Amazon for $3,300 (go.pcworld.com/surfacei7amz).

For hardware addicts, that CPU is a disappointment. With truckloads of laptops now using Intel's 7th-gen Kaby Lake CPUs (go.pcworld.com/kabylakerv), you're probably wondering why Microsoft "pulled an Apple" and went with an older processor.

It appears that Microsoft was more concerned with upgrading the graphics in Performance Base. The original Surface Book featured a discrete Nvidia GeForce chip, which was custom but widely believed to be a GeForce GT 940M.

Top: The Performance Base on the newest Surface Book i7 (left) is about two millimeters thicker than the original Surface Book's base (right).

Middle: The more powerful GPU in the Surface Book i7 requires a larger 95-watt power brick (bottom) vs. the 60-watt brick of the original Surface Book (top).

Bottom: From this angle you can see just how much thicker the new Performance Base (left) is with its GeForce GTX 965M inside of it

The new Surface Book i7 packs an Nvidia GeForce GTX 965M chip with 2GB of GDDR5 RAM. The newer GPU is far faster, but also far hotter. Microsoft said it added a second fan to keep it cool, but the Performance

Base is also a little thicker than the original model, with larger air vents.

Under heavy load, the fans get louder, but the acoustics aren't bad. A bit shrill, maybe, but totally acceptable. The fans also seem to work pretty well at keeping the GPU cool. I ran a GPU torture test on the Surface Book i7 for more than an hour and although it got warmer, it didn't get uncomfortable to touch or use. So good job on the implementation, Microsoft.

Surface Book i7 performance

The Surface Book i7's CPU performance can be summed up pretty much in one sentence: It's a dual-core Intel chip. Being a 6th-generation Skylake CPU, it's around 10 percent slower than a comparable 7th-generation Kaby Lake. Of course, a lot of people won't feel that deficit very often.

After running the torture test FurMark for more than an hour, the Surface Book i7's keyboard deck was reasonably cool.

Surface Book i7

AT A GLANCE

The new Surface Book i7 sticks with the original's one-of-a-kind-ness, and ups the graphics power gloriously.

PROS

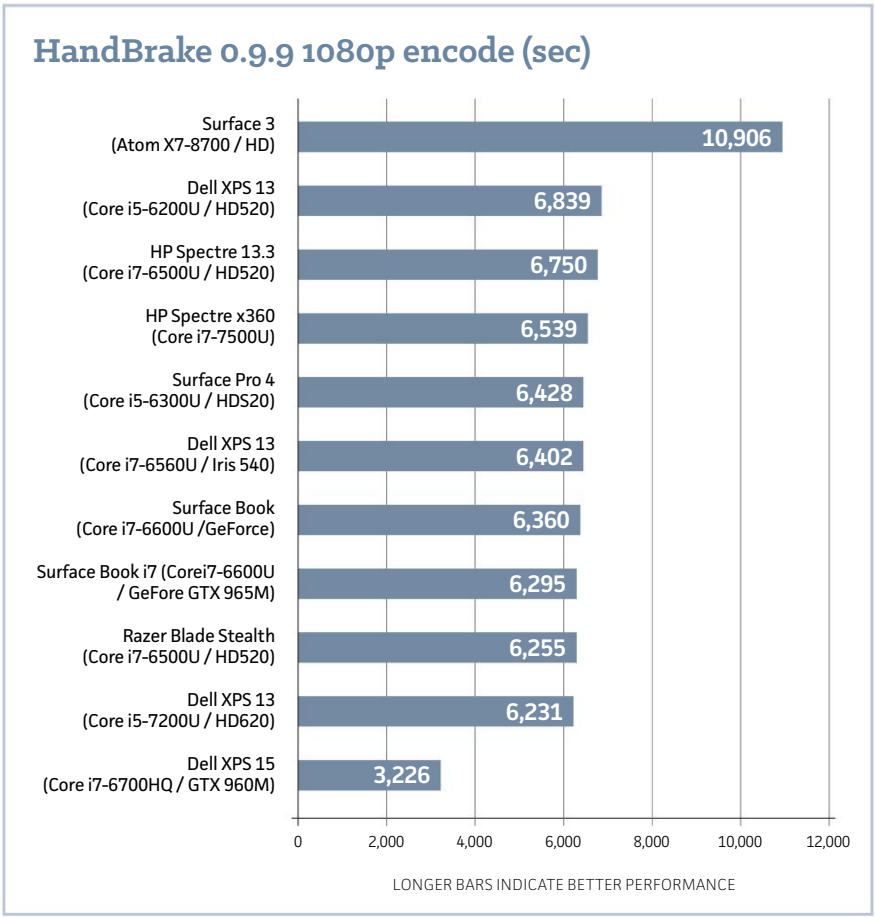
- Super-long battery life
- Best graphics performance in a 13-inch convertible
- Beautiful screen and good pen support

CONS

- Very expensive
- Heavy for a 13-inch ultrabook convertible
- No Thunderbolt 3.0 nor USB 10Gbps

$3,299

★★★★★



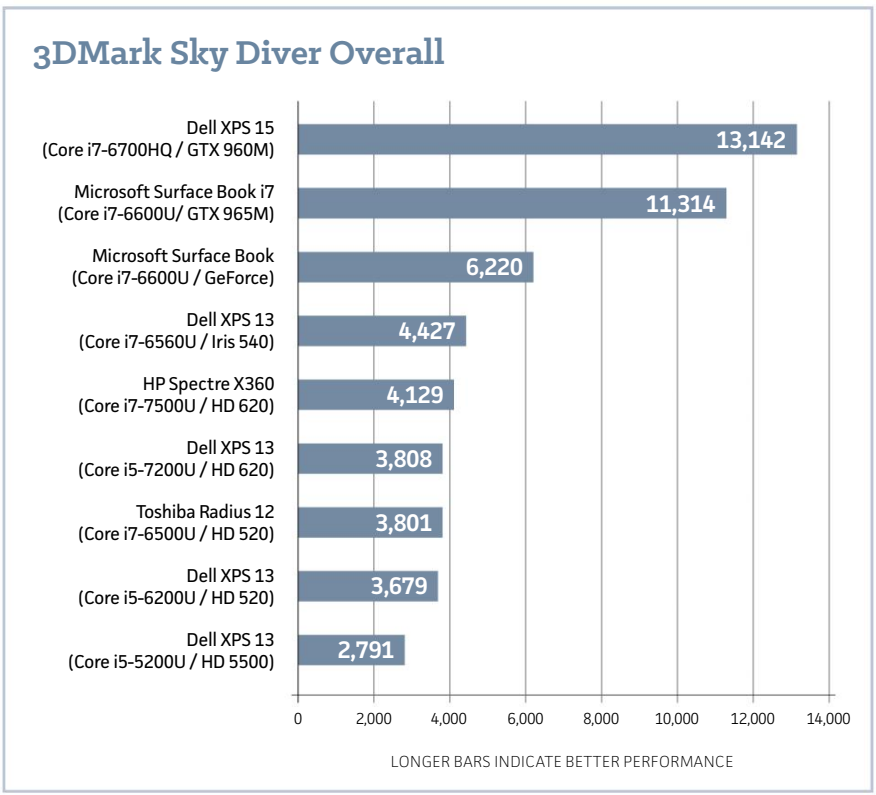
A dual-core CPU is pretty much a dual-core CPU in our lengthy HandBrake encode test.

HandBrake performance

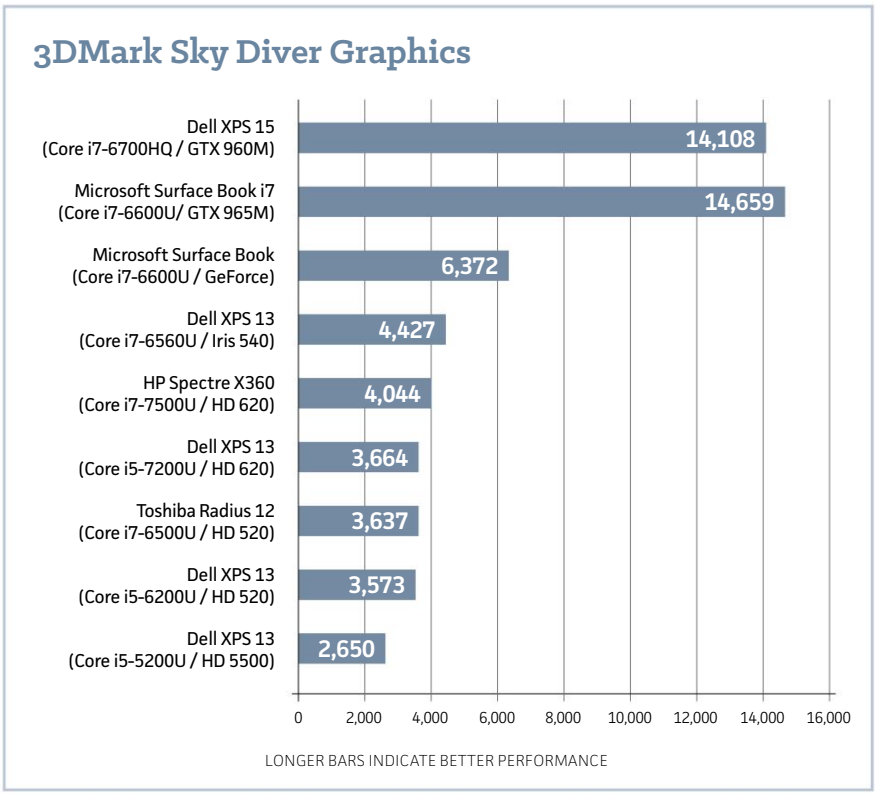
To illustrate that point, the chart above shows how the Surface Book i7 compares to a stack of the best laptops around. For additional context, I also threw in a larger quad-core Dell XPS 15 and the Microsoft Surface 3, which runs on the anemic Atom X7 CPU. Our test takes a 30GB MKV file and converts it with HandBrake 0.9.9.

On most dual-core laptops (including the Kaby Lake–based Dell XPS 13 and HP Spectre x360), it takes almost two hours to run this test, and as you can see in the chart, as the chips heat up and slow down during the course of the test, there are minimal differences in performance. That doesn't mean there aren't any differences, but the 6th-gen Skylake chip keeps up.

The chart also illustrates just how little has changed from the first Surface Book. In another performance test—the CPU-heavy Cinebench R15—the score for this year's Surface Book was actually identical to one I recorded last year.



No other 13-inch Ultrabook can touch the Surface Book i7. But is it still an Ultrabook?



Look at that GPU go.

It's all about the GPU

The performance you really care about is the GPU that Microsoft tucked under the keyboard. Even though we all hoped for some secret new AMD or Nvidia GPU, the GeForce GTX 965M doesn't disappoint.

3DMark Sky Diver performance

Futuremark's 3DMark Sky Diver is a synthetic test that measures the graphics performance of a PC. Although it doesn't use an actual video game engine, it's still well respected. For comparison I also threw in the Dell XPS 15. It's a much thicker and larger 15-inch laptop with a

quad-core CPU and GeForce GTX 960M. Since the overall score factors in the CPU cores, the XPS 15 takes the win.

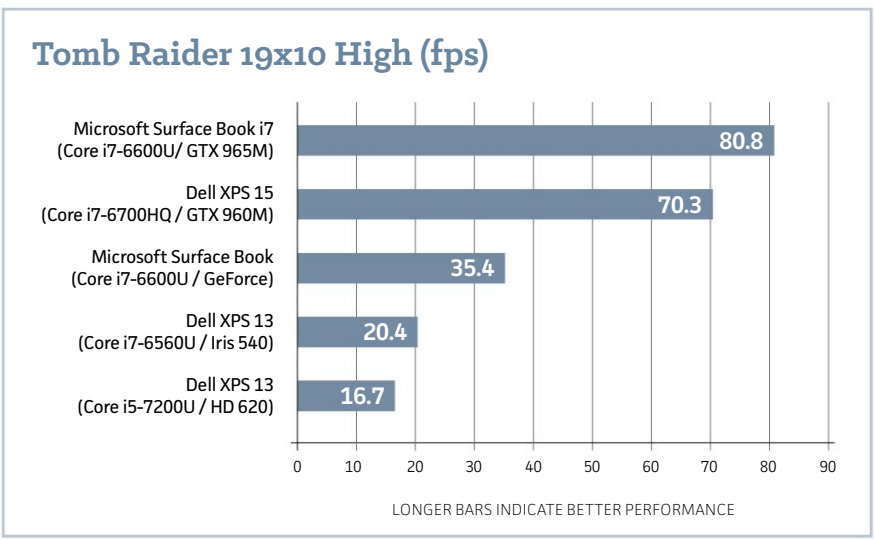
Elsewhere in the pack though, you can see how last year's Surface Book is head and shoulders above everyone else. But then you get to the Surface Book i7's GeForce GTX 965M, which is basically three times the performance of most laptops with integrated graphics. Watch out.

3DMark also gives you a sub score, which focuses solely on the graphics performance and cuts out the CPU performance. Once we take the quad-core out of the equation, the Surface Book i7 moves into first place. Not by as much as I expected, but it's not bad.

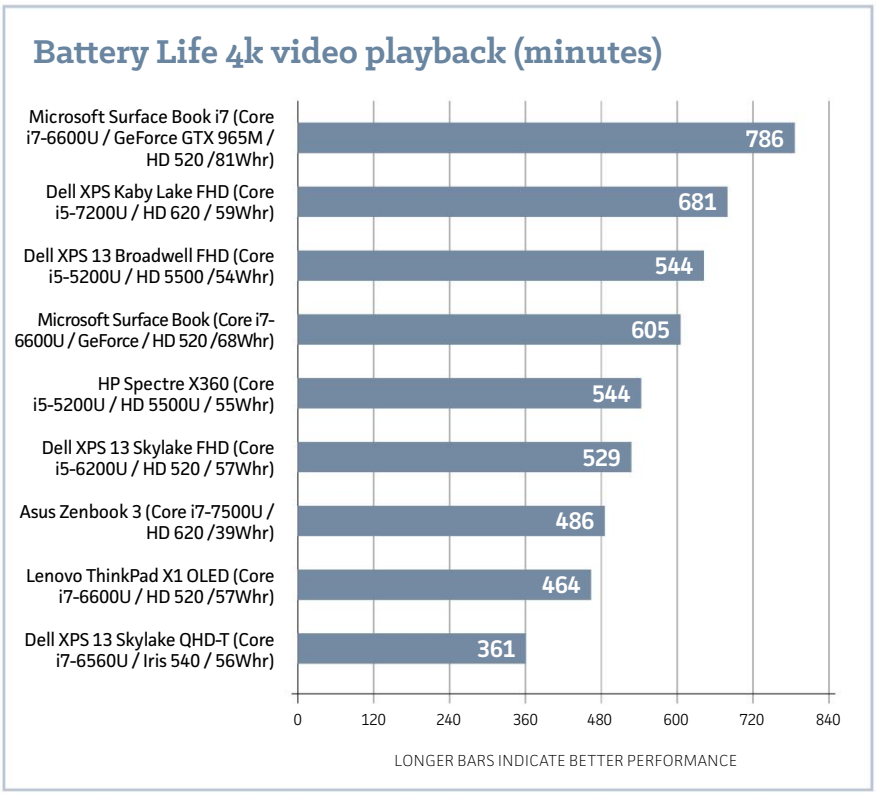
The Surface Book i7 is basically plenty fast.

Tomb Raider performance

Not everyone trusts synthetic tests though, so I also ran the 3-year-old, but still quite lovely, *Tomb Raider* game. I don't have quite as many



The Surface Book i7's GeForce GTX 965M mashes the competing 13-inch laptops in gaming performance.



With its giant battery, you also get pretty stupendous battery life out of the newest Surface Book i7.

comparable laptops, but you can see how two of the XPS 13's perform when running the game at 1920x1080 on the High setting. The slowest of the bunch is the 7th-gen Kaby Lake laptop with HD 620 graphics. Moving up to the Dell XPS 13, with an Intel Core i7-6560U and Iris 540, nets a decent boost. The original Surface Book with its GeForce GT 940M is faster still, but at 35.4fps, I wouldn't play the game. That changes with the Surface Book i7, which achieves a totally satisfying 80.8fps, and even exceeds the Dell XPS 15's GeForce GTX 960M.

Stupid-good battery performance too

With the Surface Book i7's upgrade you already know Microsoft didn't touch the tablet portion, which has the same DYN-made 18 watt-hour batteries. Where Microsoft did change things was, again, in the Performance Base, whose now-thicker profile accommodates more battery capacity. The original Surface Book with GeForce card packs a 53 watt-hour cell while the new one has nearly a 63 watt-hour battery. All told, that's a massive 81 watt-hour battery pushing the Surface Book i7 along. To see how well it does, I ran our standard video rundown test on both it and the last-gen Surface Book.

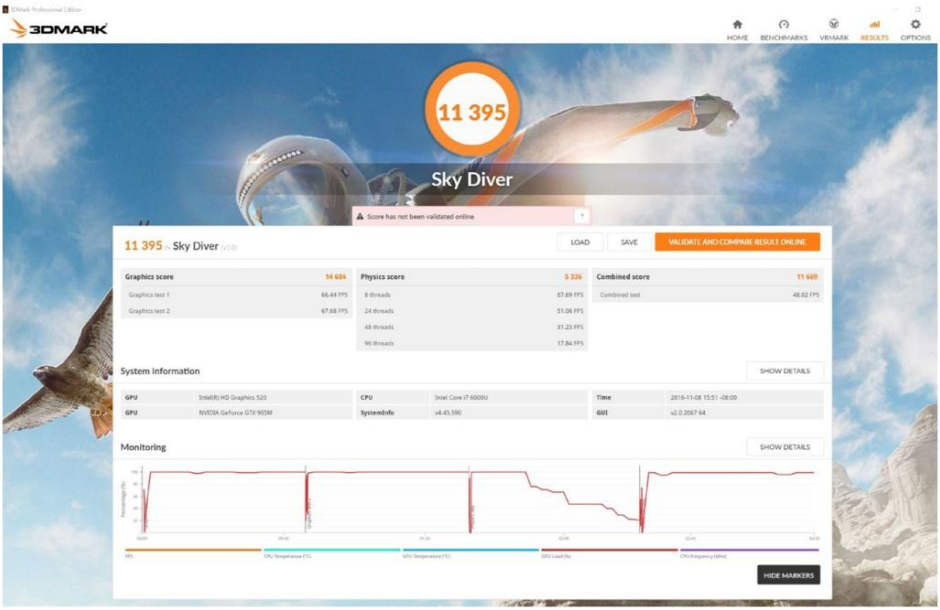
Our test loops a 4K resolution movie using Windows 10 Movies & TV app. That particular app is selected because it's a super-efficient video player. We set the laptops to airplane mode and the brightness to a relatively bright 250 to 260 nits to approximate what you'd use in a typical house or office in the daytime. Audio is enabled but we use a pair of small earbuds.

The result? Stupendous battery life. In fact, it set a new record for battery life in a laptop at just over 13 hours of playback.

The result? Stupendous battery life. In fact, it set a new record for battery life in a laptop at just over 13 hours of playback. The original Surface Book gave us a respectable 10 hours and the next closest competitor was Dell's current XPS 13 at about 11 hours.

Think of it as Project Ara, but that you can buy

Since the tablet of the new Surface Book i7 appears to be exactly the same as the original, I naturally wondered if I could simply attach the original to the upgraded Performance Base, since that's where most of the upgrade happened. Sure enough, the two sides fit, and after a few driver downloads it was a go. Don't believe me? Check out the screenshot on the next page of last year's Surface Book tablet with the new Performance Base and its GeForce GTX 965M.



In some ways, the Surface Book i7 is the first modular laptop. With the GPU and extra batteries stored in the base, you could, in theory, upgrade by just buying a new base. It's almost like Google's cancelled Project Ara, except it's an actual product.

The problem, of course, is that Microsoft doesn't sell just the base.

That's too bad because I think Microsoft is missing an opportunity. Plenty of people who bought a Surface Book last year are probably still pretty happy with the Skylake CPU and tablet portion, but that GeForce GT 940M is getting long in the tooth. If I cared about graphics performance and I had the original, I'd jump at the chance to buy the Performance Base with the GeForce GTX 965M upgrade.

That score is the same as we got with the "new" Surface Book i7 and the Performance Base.

What's wrong with it

The most obvious problems are the prior sins. The original Surface Book amazed everyone at launch but went through many months of teething pains with docking and undocking issues, and multiple

firmware fixes issued over the last year, which both corrected and then reintroduced new docking or sleep issues.

In the interest of full disclosure, I used an original Surface Book (although not the original review sample) off and on for the better part of the last 10 months. For the most part, problems were few and far between but they were there and occasionally maddening.

But whether those were problems with the Surface Book, per se, or issues induced by Windows 10 Insider Preview program, I don't know. Despite all that, I still have no problems recommending it.

Still, I have complaints. The most prominent is the lack of Thunderbolt 3, or at least a faster 10Gbps port. With this class of performance, "pro" ports should be part of the package.

One of the stickiest points with the Surface Book i7 is its price. The

Microsoft's Surface Book i7 (bottom) certainly isn't the tiniest laptop around compared to the last-generation MacBook Pro 13 (second from bottom), the latest-generation HP Spectre x360 13 (third from bottom), and Dell's bantam XPS 13 (top.)

unit you see here with Core i7, 16GB of RAM, 1TB SSD, and GeForce GTX 965M is $3,300.

Ouch. A comparably spec'd MacBook Pro 13 will set you back $2,900—so yeah, this is a premium product at a premium price.

You can knock $500 off the Surface Book i7's price by cutting the SSD capacity in half. Or you can step down to 8GB of RAM and a 256GB drive for $2,400. The problem is those prices aren't competitive with competing laptops from PC makers. Of course, no other PC vendors offers anything quite like the Surface Book i7 either.

It's either too light or too heavy

The other issue I have is the size and weight of the Surface Book i7. I weighed our review unit at three pounds, 10 ounces. That's only two ounces heavier than the original Surface Book, but it's hefty. The current Dell XPS 13 with a 7th-gen CPU and no touchscreen is about a pound lighter.

Going the other direction, the MSI GS63VR Stealth (go.pcworld.com/msigs63vrstealthrev) with a quad-core Skylake chip, 15-inch screen, and a much more powerful GeForce GTX 1060 weighs just seven ounces more than the Surface Book i7.

It's heavy enough that you might consider getting a larger quad-core alternative, but yet light enough that you might be tempted to opt for the even-lighter competition.

And that MSI will plain blow the doors off the Surface Book i7 in everything, save battery life and build quality. Well, and screen quality.

The perennial target of the Surface Book i7, Apple's MacBook Pro 13, has also recently gone on a diet and weighs just about three pounds. That kind of puts the updated Surface Book i7 in a strange, middle place: It's heavy enough that you might consider getting a larger quad-core alternative, but yet light enough that you might be tempted to opt for the even-lighter competition.

Conclusion

When Microsoft announced details of the Surface Book i7, I was pretty disappointed in its middle-aged hardware.

In use, however, it appears there's plenty of life left in these parts. That the Surface Book i7 can actually give you better graphics performance than a larger 15-inch laptop with discrete graphics is amazing.

Combined with its tablet mode, swanky hinge, pen support, beautiful screen, and stellar battery life, it's easy to remember what made us fall in love with the Surface Book in the first place.

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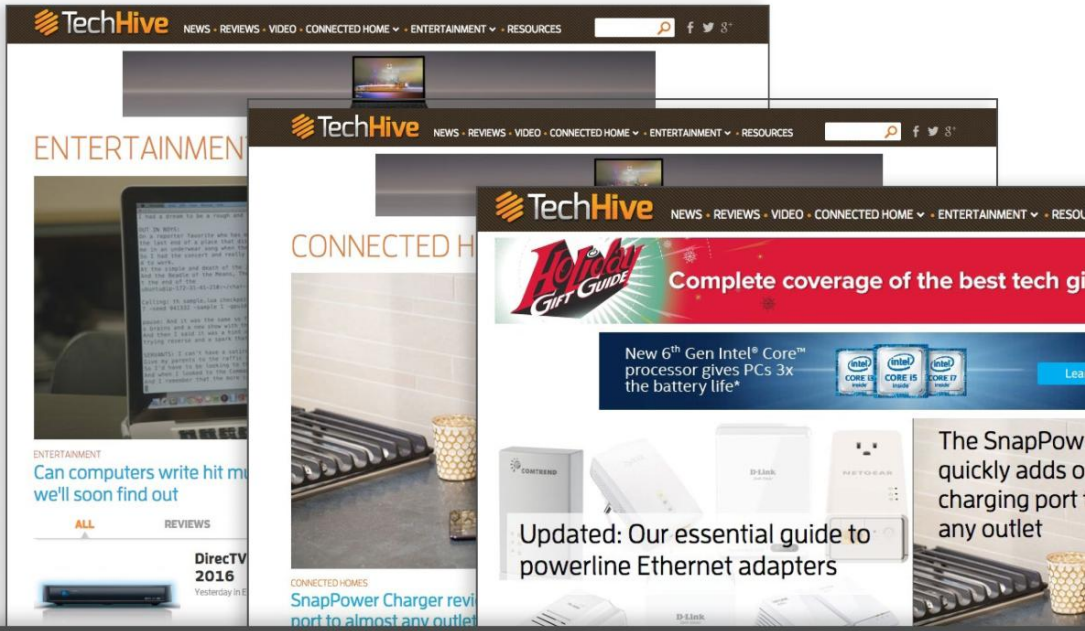

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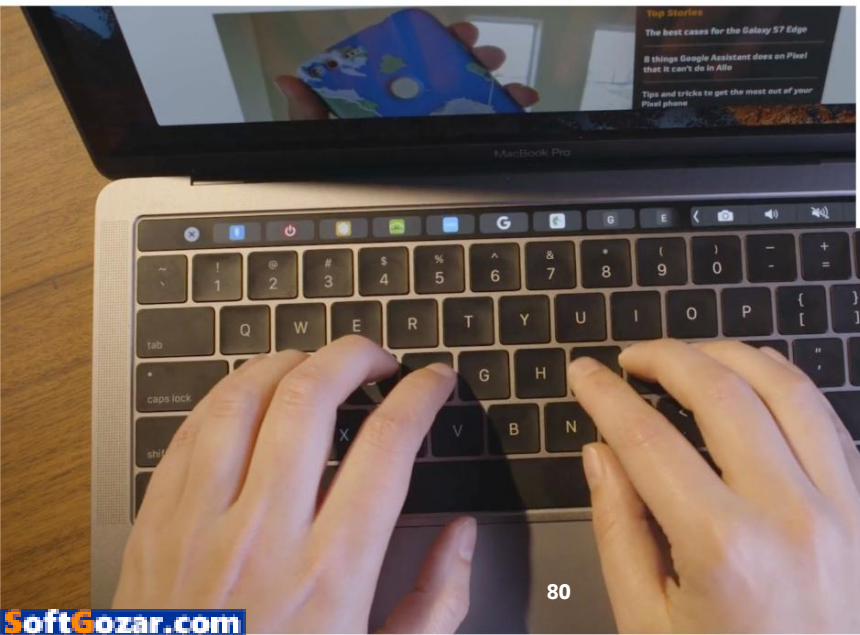
MacBook Pro with Touch Bar: The best bits of iOS in a really great Mac

BY SUSIE OCHS

APPLE GAVE ITS new MacBook Pro a thinner, sleeker case, which demanded a new, lower-travel keyboard, a new venting system, and even a smaller battery. But while I appreciate a Mac that's smaller and lighter, I'd rather have a Mac that's easier or just more fun to use. These 13-inch and 15-inch MacBook Pros with Apple's new Touch Bar are both.

The Touch Bar brings my favorite things about the iPad Pro's software keyboard to the Mac. The amount of useful shortcuts it adds



Watch the video at go.pcworld.com/macbookpro2016vid

is ridiculous, and this is before most third-party developers have even had a chance to add Touch Bar support. Even for a premium price—and these Macs aren't cheap—I think the Touch Bar makes this a much more compelling buy than the MacBook Pro with function keys.

Meet the Touch Bar

The Touch Bar is an OLED strip that's tempting to call a display, but Apple wants developers and users to think of it as an input device, not a display. You can't adjust its brightness yourself, for example, because if it was too bright it would start looking more like a display than a set of keys. It's also optimized for viewing at a 45-degree angle, looking down from above, which is odd for any screen. Nonetheless, the Touch Bar stays visible and legible even if you are sitting at an off-angle to your Mac.

The Touch Bar is incredibly handy not only because its controls change to match the app you're using, but also because it's so customizable. Visit *System*

The Touch Bar is designed to blend in and look like keys, not a bright, glowing display.

13-inch MacBook Pro, 2.9GHz Core i5, 256GB storage (late 2016)

AT A GLANCE

The 13-inch MacBook Pro with Touch Bar is more pleasant to use than its predecessor, and a great (if pricey) upgrade for MacBook Air owners too.

PROS

- Touch Bar adds contextual, customizable, multi-touch controls in place of function keys
- Extra-bright screen with P3 color gamut
- Great battery life

$1,799

★★★★½

I customized my Control Strip to include volume, brightness, a screenshot button, and Siri.

Preferences > *Keyboard*, and you can choose what happens when you press the Fn key. The default shows the function keys: F1, F2, and so on. But if you never use those keys, you could also have the Fn key expand the Control Strip to full size.

The Control Strip is a set of four of your favorite keys, and it stays on the right side of the Touch Bar all the time. You can choose which four buttons you want in *System Preferences* > *Keyboard* by clicking Control Strip. That will display a grid of buttons on your screen, and then you use the MacBook Pro's giant trackpad to drag them from the screen directly onto the Touch Bar. The default set of Control Strip keys is brightness, volume, mute, and Siri, but you can select from tons of useful shortcuts, like buttons to take a screenshot, start dictation, open Notification Center, or put your Mac to sleep.

Sure, you could use keyboard shortcuts and hot corners to do these things instead, but having them on

15-inch MacBook Pro, 2.6GHz Core i7, 256GB storage (late 2016)

AT A GLANCE

The combination of faster storage and RAM, a gorgeous 15-inch screen, four Thunderbolt 3 ports, and the innovative Touch Bar make this the best Mac laptop money can buy.

PROS

- Can drive two external 5K displays plus the built-in Retina display
- More powerful speakers

CONS

- Keyboard is a step down from previous generations

$2,399

★★★★½

the Touch Bar is better. The Control Strip has room for four buttons, and you can tap an arrow to expand it to the full set of controls that once lived on the row of function keys (screen brightness, Mission Control, Launchpad, keyboard backlighting, iTunes controls, volume controls).

The Escape key, which is no longer a real physical key, hangs out on the left side of the Touch Bar almost all the time. The only time it goes way is when you expand the Control Strip to its full length, but when that happens, an X button shows up where you'd expect Escape to be, and tapping X shrinks the Control Strip again to reveal the Escape key. Keyboard shortcuts that use Escape still work (like Command-Option-Escape, to force-quit an app), but if you're concerned that the Touch Bar itself could freeze up and prevent that, you could always remap Escape to a different physical key (go.pcworld.com/esckeymcbkpro). I'm not going to bother, because in my time with the Touch Bar, it's worked perfectly.

Using the Touch Bar in apps

Along with the Escape key and the Control Strip, the Touch Bar presents app-specific controls in the center, and that's where the real

Favicon of your favorite sites: How cool is that?!

magic happens. This is just a short list of the ways the Touch Bar delighted in me in each app.

- In Mail, the Touch Bar makes sorting the inbox fast and easy, with buttons for flag, archive, and delete, as well as a button that guesses where you might want to file each message.
- In Safari, when a video starts playing, a pause button and scrub bar appear on the Touch Bar. Tapping that pause button is a much quicker way to shut the video up than having to find the cursor onscreen, then find the video and hover over it to get the player's pause button to appear.
- Also in Safari, when you select the Location bar to type in a new URL or search, the Touch Bar fills with favicons for your favorite sites. The first time I saw the Macworld logo on the Touch Bar, I giggled out loud.
- When filling out forms in Safari, QuickType suggestions on the Touch Bar will pop up with your name, address, phone, and email when you tab to those fields.
- In Messages and Mail, the emoji picker gets a button on the Touch Bar. Tap it and you can scroll through all the emoji or jump to a certain category. It's faster than pressing Command-Control-Space and then using the Character picker to find and click emoji with the trackpad.
- In Calendar, if you select an appointment that someone else

The new MacBook Pros will speed up your emoji workflow considerably.

invited you to, there's a button on the Touch Bar to send that person a message.

- If I'm trying to navigate with mostly the keyboard, dialog boxes can sometimes pull me out. Now, the options in a dialog box also show up on the Touch Bar.
- I also love how the Control Strip's volume and brightness controls are a single button, and not two buttons (one to increase, one to decrease) like on a function key Mac. You just tap the button to see a slider, and you can even tap and keep your finger down to slide up or down, even if your finger isn't directly on top of the slider. A smooth slider makes more sense than having to tap-tap-tap a single key to crank the music or brighten your screen.

Mostly, the Touch Bar just adds a new level of surprise and dare I say delight to using a Mac. It's a bigger deal to me than Sierra's addition of Siri, because while talking to my computer in the middle of my office isn't something I'm comfortable doing, using the Touch Bar isn't a stretch at all. My hands are already on the keyboard, and my eyes are already on the screen, so the Touch Bar is in a great spot for my eyes to flick down while my fingers reach up. Tapping a button on the

The Touch Bar can speed up surfing in Safari.

The Touch Bar makes choosing colors so easy, I might start color-coding my note-taking just for fun.

Touch Bar takes less movement than reaching down to the trackpad to click that same button onscreen. Sure, keyboard shortcuts are even faster, but I don't remember keyboard shortcuts for even a fraction of the buttons I see on the Touch Bar.

Third-party developers are adding Touch Bar support too. Apple says that Microsoft Office, Photoshop, Pixelmator, the Omni Group's apps, djay, and many more apps will be updated to support the Touch Bar. Some apps have limited support without an update—I'm typing this in Byword 2.7, which doesn't have official support as of this writing, but the Touch Bar is showing me the same QuickType options and emoji picker that I enjoy in apps like Messages and TextEdit. If I select some text, I get the same formatting controls in the Touch Bar as I would in Mail or Pages. I'll take it.

Speaking of QuickType suggestions, this is one area where the Touch Bar falls flat. I type about 80 words a minute, and suggestions just can't keep up with that, lagging as far as two words behind my fingers. While I'm in the midst of typing a sentence, the words tend to freeze up and only change when I stop typing. But the suggestions can be

useful if you're a hunt-and-peck typer, or you're, say, holding a sandwich in one hand while one-finger typing with the other. (Hey, a lot of us eat lunch at our desks.)

I love being able to customize the Touch Bar. Check the View menu of the Finder and all your Apple apps (except, frustratingly, iTunes) for an option to Customize Touch Bar, and then you can rearrange the buttons on the Touch Bar itself, or use the trackpad to drag new buttons from an onscreen menu right off the bottom of your display, where they drop down onto the Touch Bar. It's a cool effect, and fairly intuitive even the first time.

The Touch Bar also has Touch ID, which lets you log into your Mac, authenticate Apple Pay transactions in Safari, and authorize purchases in the iTunes and App Stores without having to type your password. I also love being able to use Touch ID in System Preferences, instead of typing my Mac's password. Developers can use Touch ID too—1Password already added support, letting you unlock your password vault with Touch ID, just like you can on iPhones and iPads with Touch ID.

Overall, it's just really cool to have contextual controls on top of the keyboard—I praised the 12.9-inch iPad Pro's software keyboard (go.pcworld.com/ipadpro5things) on the first day I got it because it had enough real estate to include extra buttons and controls. Ditching the

You have to click a Touch ID button in 1Password's login screen to be able to unlock your vault with Touch ID, but it's much faster than typing in a complex password.

function keys on the MacBook Pro gave Apple that extra real estate to bring the best parts of iOS—the freedom to put buttons where they're most useful, when they're most useful—to the Mac.

Performance

Let's not forget that there are computers attached to these Touch Bars. In my earlier review of the 13-inch MacBook Pro with function keys (go.pcworld.com/13inmcbkpro), benchmarks showed only a slight improvement in CPU speed over the previous generation, but much better graphics performance. These MacBook Pros did a little better.

Apple supplied us with stock, entry-level models of the 13-inch and 15-inch MacBook Pro with Touch Bar. The 13-inch has a 2.9GHz dual-core Intel Core i5, 8GB of 2133MHz RAM, Intel Iris Graphics 550, and 256GB of storage. The 15-inch model has a 2.6GHz quad-core Intel Core i7, 16GB of 2133MHz RAM, Radeon Pro 450 graphics with 2GB of memory, and 256GB of storage. We also had a stock model of the 13-incher with function keys, which makes comparing them across the line pretty easy.

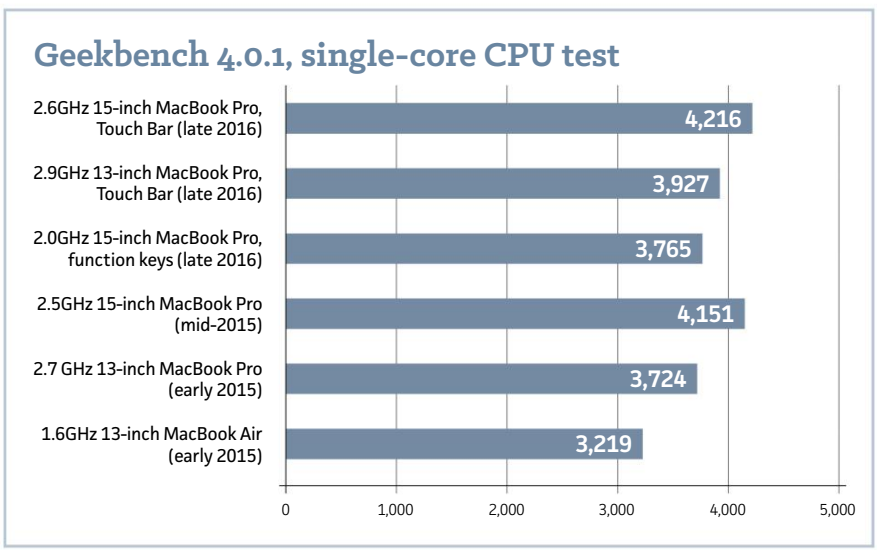
In Geekbench 4.0.1, the 13-inch MacBook Pro with Touch Bar scored

3927 in the single-core 64-bit CPU test, which is 5.3 percent faster than the previous generation's score, and 4.2 percent faster than the just-released 13-inch 2GHz MacBook Pro with function keys. The 15-inch MacBook Pro scored 4216, which is just 1.5 percent better than 2015's 15-inch MacBook Pro (go.pcworld.com/mcbkprocorei7) with 2.5GHz quad-core Core i7 with 16GB of RAM and a discrete AMD Radeon R9 M370X.

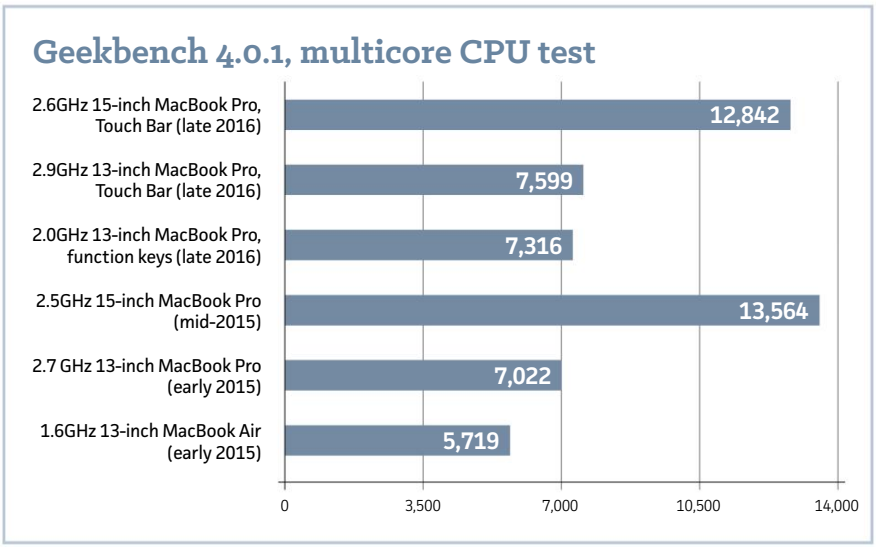
In the multicore CPU test, the 13-inch MacBook Pro with Touch Bar bested last year's 13-inch Pro by 7.9 percent, and this year's function key model by 3.8 percent. The 15-inch MacBook Pro with Touch Bar was was actually edged out by last year's version in this test.

In Geekbench's OpenCL test, the 13-inch MacBook Pro with Touch Bar scored 30826, using the Intel Iris Graphics 550—that's 59 percent better than the last generation. The 13-inch MacBook Pro with function keys has Intel Graphics 540, and so this Touch Bar model scored 8.6 percent better.

The 15-inch MacBook Pro with Touch Bar scored 42827 in Geekbench's OpenCL test when using the AMD Radeon Pro 450



Geekbench 4.0.1, single-core CPU test. Longer bars are better. The top three are this year's Macs, and the bottom three are last year's.

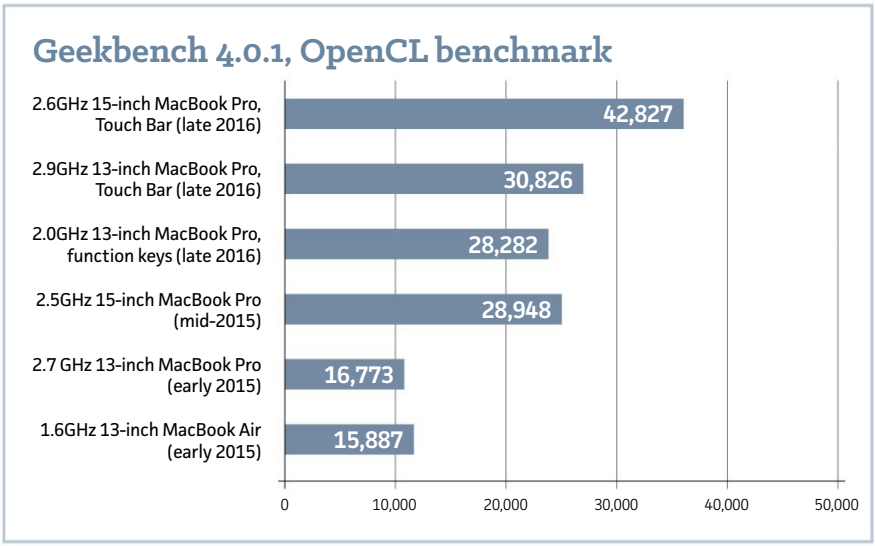


Geekbench 4.0.1, multicore CPU test. Longer bars are better. The top three are this year's Macs, and the bottom three are last year's.

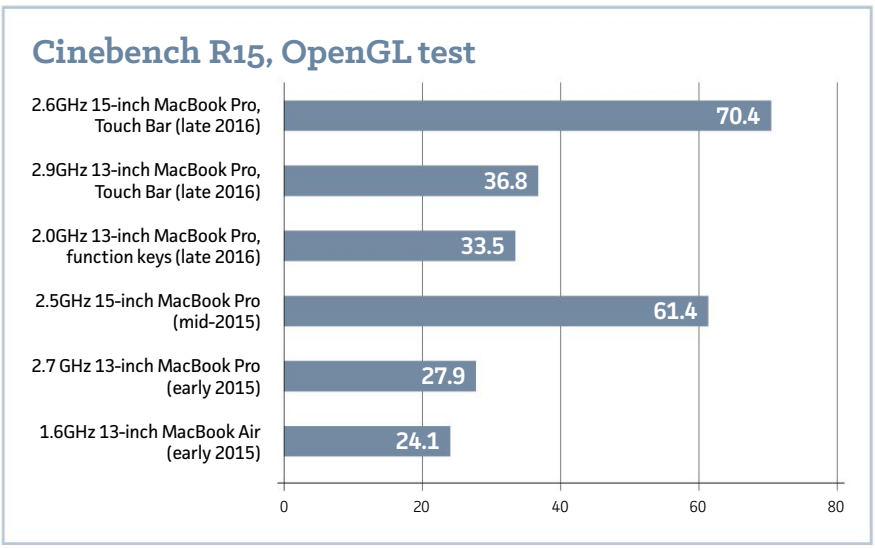
graphics, which is 38.7 percent better than the last gen. This model has 2GB of dedicated graphics memory, but you can upgrade to a Radeon Pro 460 with 4GB of memory for $200. The 15-inch MacBook Pro also contains an Intel HD Graphics 530 chip that can be used to extend battery life during less-intensive tasks.

Using Cinebench's OpenGL benchmark to further test the graphics, the 13-inch MacBook Pro achieved 36.8 frames per second, which is 27.5 percent faster than 2015's entry-level 13-inch MacBook Pro, and 9.4 percent faster than this year's 13-inch MacBook Pro with function keys. The 15-inch MacBook Pro scored a whopping 70.4 frames per second, which is 13.7 percent faster than the last generation.

So does this mean the 15-inch Mac is powerful enough for pro video editors, even with a maximum of 16GB of RAM? Probably. There's a chance Apple will increase the RAM to 32GB next year if it updates the MacBook Pro line to Intel's next-gen Kaby Lake processors, but even now, one professional video editor (go.pcworld.



Geekbench 4.0.1, OpenCL benchmark. Longer bars are better. The top three are this year's Macs, and the bottom three are last year's.



Cinebench R15, OpenGL test. Longer bars are better. The top three are this year's Macs, and the bottom three are last year's.

com/cartermcbkpro) who uses Final Cut Pro finds the MacBook Pro "buttery smooth." It's worth noting that the 15-inch MacBook Pro can drive two 5K external displays, plus the 2880x1800 built-in display, and still have ports for two external Thunderbolt RAID arrays.

No one should be surprised that Apple chose to make its MacBook Pros smaller and lighter.

Redesign pros and cons

The redesigned bodies of both models are thinner and lighter than the MacBook Pros they replace, but there are tradeoffs to achieve these svelter profiles. The low-travel keyboards use Apple's new butterfly mechanism. This keeps the nicely sized keys from wobbling if you strike them off-center, but I much prefer having more travel, like on the last generation of MacBook Pro and the MacBook Air line. In fact, I'd be willing to carry a thicker laptop to keep that style of keyboard. (It's a personal preference, of course.)

The fan vents on the bottom, one on either side, are another quirk. They feel almost sharp if you happen to run your finger across them, and since they're on the bottom of the machine, I'd worry about getting water in them if I happened to spill on the desk.

Oh, and the Apple logo doesn't light up anymore, just like on the 12-inch MacBook. That's a bit of a bummer.

What isn't a bummer are the new speakers, my favorite non-Touch Bar feature of the new machines. Apple explained that since they are connected right to the battery with no transformer between them, the speakers can get twice the peak power—and you can really hear the difference. Music sounds great when you turn the volume all the way up, and the speakers are powerful enough to provide satisfying sound while watching movies, TV, and sports. The 15-inch model's speakers seem to have more oomph than the 13-incher's, but both can ably fill a hotel room with music, if you should want to leave your portable Bluetooth speaker at home.

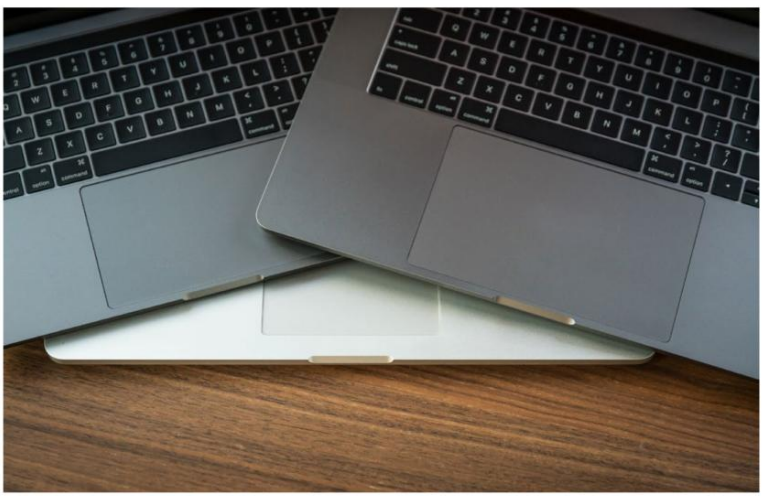
Battery life is also solid, with both models lasting a full day of heavy use, with multiple apps open, dozens of Safari tabs, streaming music to Spotify, and occasionally indulging in some video viewing with Sierra's picture-in-picture feature. More detailed battery testing will come in a separate article.

Once enough people upgrade, I'll miss seeing a sea of lit-up Apple logos in the live-streams of tech events.

Bottom line

These new MacBook Pros have a lot going for them. Their biggest weakness, across the whole Touch Bar line, is price. The 13-inch model I tested is $1799 without any upgrades, and the 15-inch is $2399. Going to 512GB of storage is $200 extra, and 1TB is $600 extra, which also seems like a lot. (To compare, last year's 15-inch MacBook Pro with a discrete AMD graphics chip started at $2499, but that included 512GB of storage.)

These prices could come down a little bit next generation, but if you need a MacBook Pro right now, the late 2016 models are solid performers. If I were buying one for myself, I'd go with the 13-inch MacBook Pro with Touch Bar and max out the storage, although the 15-inch model is even better.



While I miss the last generation's keyboard, the giant Force Touch trackpads on the new MacBook Pros are a big improvement.

Toshiba OCZ's TL100: A budget SSD that's not a bargain

BY JON L. JACOBI

THERE ARE TWO types of products that send the *PCWorld* lab into retest mode: those that perform better than expected, and those that perform worse. Toshiba's 2.5-inch, TLC NAND-based, OCZ-branded TL100 definitely falls into the latter category. As a matter of fact, after seeing a sustained write speed of less than 100MBps, a far cry from the "up to 530MBps" you'll see advertised, we started kicking tires with particular energy.

Three TL100's were tested on four separate PCs and three different operating systems (Windows 7, 8.1, and 10) to confirm that the bad

write numbers it was pulling weren't somehow related to our MO or hardware. Results varied only slightly. The drive will write around 500MBps, but only for a few seconds, then speeds decline precipitously to the 100MBps level and stay there.

HD Tune, CrystalDiskMark, and several other benchmarks not normally used were also run to make sure it wasn't an issue with our usual go-to, AS SSD. CrystalDiskMark didn't see a problem with the drive in its 1GB test, but beyond that, it was the same slow-sustained-write story.

Still faster than a hard drive

To be fair, read speed and read random-access have more to do with the apparent speed of a system than write speeds, because they are what you experience when the operating system and programs load. In that regard, while the TL100 isn't the fastest SSD we've tested, it is indeed an SSD; replacing the hard drive in your system with one will make it seem like you just strapped a rocket to it. Okay, a bottle rocket. However, the first time you copy an even moderately large file to it, you're going to wonder if you somehow broke it.

There's no nice way to say this: Unless priced ridiculously low, buy something else.

TL100 2.5-inch SATA 6Gbps SSD

AT A GLANCE

This SSD will make your system faster if it's replacing a hard drive—just not as much faster as other SSDs. It's the worst overall performer we've seen, with sustained write speeds that are considerably slower than those of a fast hard drive.

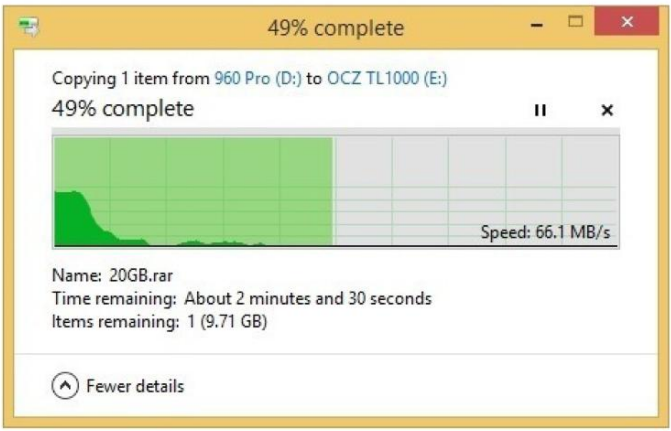
PROS

- Decent sustained read speed
- Nice upgrade from a hard drive

CONS

- Horrible write performance for an SSD
- Extremely slow random write access

★★½☆☆



The TL100 might've gotten more love around here if it had hit the market at 10 or 15 cents per gigabyte. But it showed up at $45 for the 120GB version and $68 for the 240GB version, or around 35 and 28 cents per gigabyte, respectively. That's inexpensive, but a dollar or two in savings is not enough to offset a four-fold drop in sustained write performance. Not nearly.

At first, as the write speeds declined so quickly, we suspected a lack of cache. After consulting OCZ/Toshiba, the company explained that there indeed is cache in the drive, but it's used differently than with previous drives in an attempt to smooth performance. It didn't work, unless you consider 60MBps to 100MBps in our real-world tests a successful levelling.

Note that our real-world copy tests utilize compressed files that negate the minimal performance advantages offered by SSD controllers that compress data. That's the beauty of AS SSD as well. This was a choice made several years ago to eliminate fantastical test results generated using highly compressible files that didn't remotely mirror users' actual experiences. Highly compressible files such as text or raw images comprise a very small percentage of most users' data.

As you can see in the chart on the next page, the TL100 is an okay reader. As mentioned, you will definitely notice a boost in performance if this SSD replaces your hard drive, just not as much as you would with similarly priced SSDs that read 15 percent faster and write 400 percent faster.

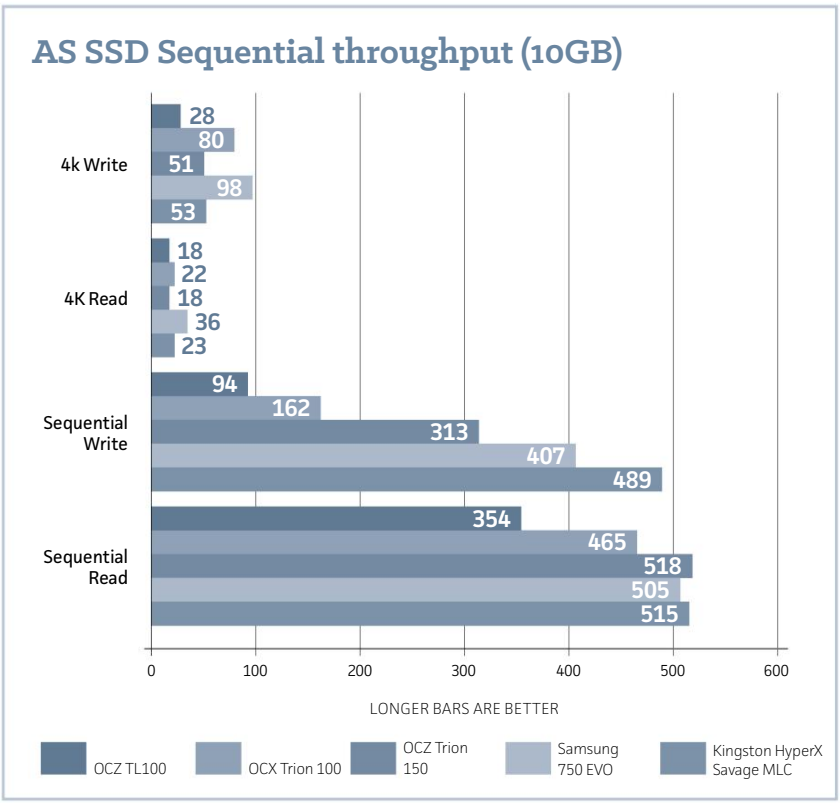
The AS SSD Access Times chart was a real puzzler. We've never seen

We were a bit stunned by the TL100's performance: The preceding Trion 150 was a great improvement on the original Trion 100. This drive is two steps backward.

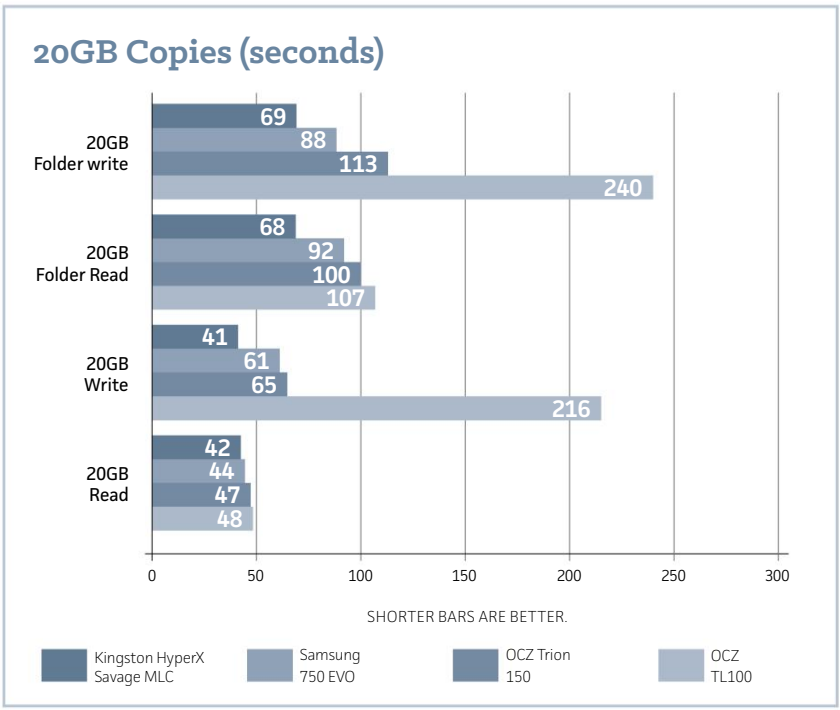
an SSD write access-time even remotely as slow as the TL100's. This may have been an interaction between the TL100 and AS SSD. The drive handled operating system duties, which stress random access, just fine. We were still investigating at the time of this article.

TLC NAND

It would be nice if TLC always stood for tender loving care, and not triple-level cell (3-bit) NAND. At least when it comes to writing data. It's inherently slower than MLC (multi-level cell/2-bit) and SLC (single-level cell/1-bit) at writing, but the TL100 is uniquely slothful. Samsung



So far, Samsung's 750 EVO is the only TLC NAND drive that's gotten it right.



When it comes to writing large amounts of data, the TL100 is actually slower than some hard drives.

manages to wring a very respectable 400MBps out of its TLC on the 750 EVO, and Toshiba manages 240MBps with its Trion 150. The TL100's 94MBps? Wow. And that's not a good wow.

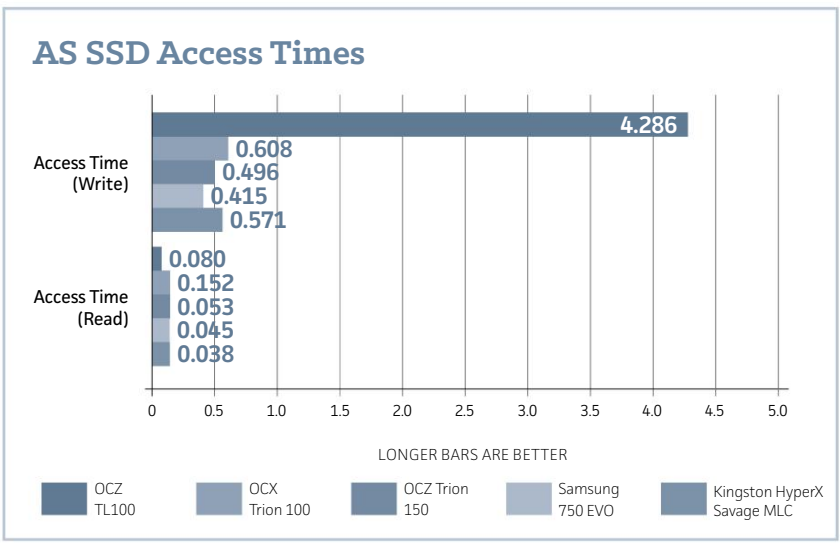
Note that this is not a diatribe against TLC per se. Not in the least. If the performance shortcomings and cost savings are appropriately balanced, TLC can be a great thing. But so far, only Samsung's 750 EVO has delivered sustained write performance commensurate with price, when compared with MLC NAND SSDs.

Also, this is not about whether you'll get a boost in performance when you replace your hard drive with an SSD. Again, any SSD, even a slow one such as the TL100 will do that. This is about how much of a boost you get, and for how much.

Conclusion

Let's keep this short and sweet. Unless you see this drive in a bargain bin for $20 (120GB) or $40 (240GB), don't buy it. There's no pleasure in saying that—in fact, it pains me to see what Toshiba is doing to the OCZ brand.

Instead of the TL100, brown-bag it for a day and get the Samsung 750 EVO (go.pcworld.com/samsung750evo) ($70 for 256GB on Amazon go.pcworld.com/samsung750evoamz) or a nice MLC drive such as OCZ's VX500 (go.pcworld.com/oczvx500) ($97 for 256GB on Amazon go.pcworld.com/oczvx500amz) or the Transcend SSD370 (go.pcworld.com/transcendssd370) ($93 for 256GB on Amazon). If you absolutely must go with the cheapest drive available, there are several like-priced TLC drives, including OCZ's own Trion 150 (go.pcworld.com/ocztrion150) ($75 for 240GB on Amazon go.pcworld.com/oztrion150amz) and Crucial's MX300 (go.pcworld.com/crucialmx300750) ($70 for 275GB on Amazon go.pcworld.com/crucialmx300750amz) that offer significantly better all-around performance.



Shorter bars are better.

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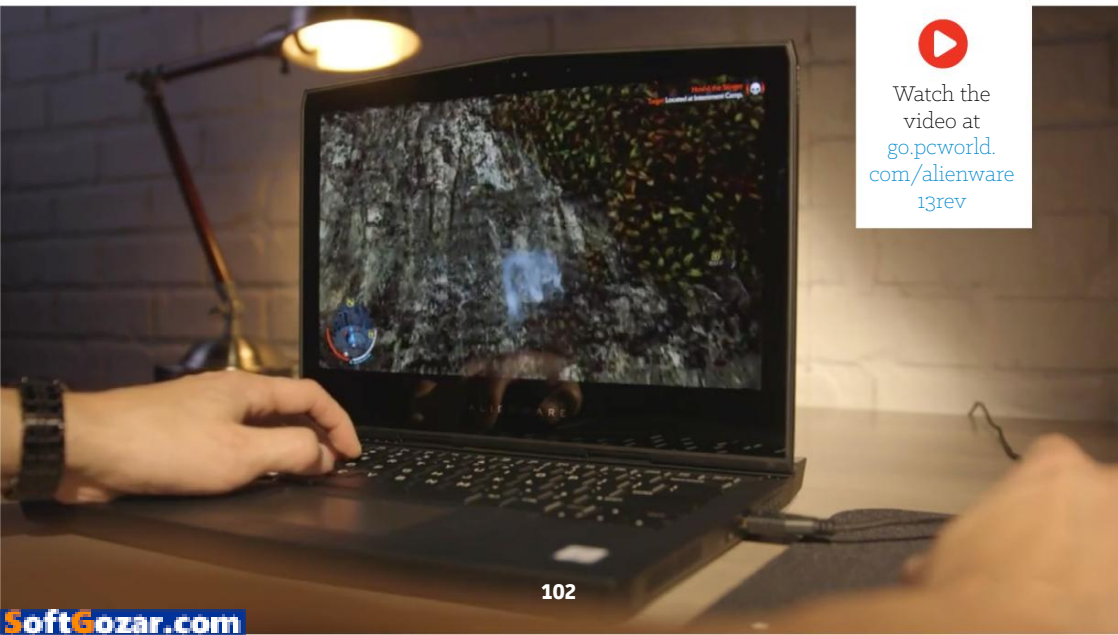
Alienware 13 (2016): The first OLED gaming laptop has landed

BY JOSH NOREM

NOT LONG AGO, we got our hands on a 2-in-1 notebook with an OLED screen—the Lenovo Thinkpad X1 Yoga (go.pcworld.com/x1yogarev)—and were mesmerized by its display. It's one of those technologies that once you see it with your own eyes, you can never go back to the old way of things. You become that person at parties who says, "You're still using an LCD? I used to have one of those in 2015."

With the launch of Alienware's all-new 13-inch notebook, the Alienware 13, mobile gamers can now finally experience the revelation



Watch the video at go.pcworld.com/alienware13rev

that comes with gazing upon an OLED panel. Though this technology has had some issues coming to market (go.pcworld.com/oledmomentum), it's been trickling out over the course of this year—and putting LCDs on notice. Once seen as crisp and high-res, LCD panels suddenly seem pixelated, washed out, and nowhere near as vibrant when compared to OLED. The Alienware 13 was my first time experiencing an OLED panel in person, and I assure you it's stunning—to put it lightly.

In addition to the snazzy display, which also supports touch gestures, this surprisingly small and dense notebook sports top-shelf hardware throughout. Its Nvidia GTX 1060 GPU makes it VR-capable (it's the first sub-14-inch notebook we've seen that is), and it also supports Alienware's Graphics Amplifier technology (go.pcworld.com/alienwamplifier), if you decide you need more ponies under the hood in the future.

The display

The basic deal with OLED displays is that they reproduce much richer colors (go.pcworld.com/oled

Alienware 13 (2016)

AT A GLANCE

This 5-pound laptop is one sweet little machine, even if it's a bit heavy for its size. If you can deal with that weight, you get an extremely well-rounded machine that excels in every way possible.

PROS

- Stunning OLED display
- Superb all-around performance
- Small and compact

CONS

- Keyboard gets warm under taxing workloads
- A bit heavy for its size

★★★★½

vsled) than LCDs, and also deep, dark black, which makes an LCD's black look gray by comparison. Overall sharpness and saturation are also way beyond what I've seen on LCDs over the years. OLED panels are more energy-efficient than LCDs, too, so it makes perfect sense for a notebook to be rocking one of these.

This Alienware laptop has an OLED panel that runs at 2560x1440, despite being just 13.3-inches in size. If you're not in to OLED due to price, its "velvety" look, or what have you, Alienware also offers the 13 with either a 1366x768 TN or a 1920x1080 IPS panel, both LCD.

I recommend the OLED option, though. Like that line in *Ferris Bueller's Day Off* says, "It is so choice. If you have the means, I highly recommend picking one up."

The chassis

Like the display, the Alienware 13's chassis offers something unique. Instead of being a bland, plastic slab, the Alienware 13 is angular and has the look of chiseled metal. And despite being still mostly plastic (the lid and underbelly are all aluminum, though), it feels incredibly rigid. The overall construction just seems dense, like there's not a single area inside the notebook that's hollow.

This feeling of density is also due to the Alienware 13's weight, which tilts the scales at almost 5.5 pounds. That's heavier than other 13-inch gaming laptops by about a pound or so. But the solidity is reassuring, and

even things like the display hinge are tight and offer zero flex whatsoever.

Speaking of the hinge, it's part of a redesigned chassis for this updated model that Alienware calls a "hinge forward" design. The screen sits about an inch forward from the rear of the chassis (instead of flush, like on the previous model), so the laptop looks like it has one of those extra-big batteries installed. Alienware says this design choice allows it to offer more rear ports, larger fans for increased cooling without additional noise, and an improved speaker system.

The company also says that the redesigned chassis is "up to 21 percent thinner" than the previous model. In my opinion, the new look is much more streamlined and a big improvement on the previous (and chunkier) model. Alienware also improved the finish on the plastic used for the palm rest to prevent fingerprints and smudges, and it works beautifully.

As far as ports go, this 13-inch laptop has almost as many ports as a bigger system. There are two USB 3.0 Type A ports, one Thunderbolt 3

port, a USB 3.0 Type-C port, gigabit ethernet, HDMI 2.0, Mini DisplayPort 1.2, audio out, a lock slot, and also jacks for a microphone and headphone. There's also an Alienware Graphics Amplifier (go.pcworld.com/alienwamplifierrev) port.

The laptop is also easily upgradeable, though the only components you can really access are the memory and the SSDs. In our test system, one of the M.2 modules was empty, and the RAM was in plain sight after removing the bottom lid.

The hardware

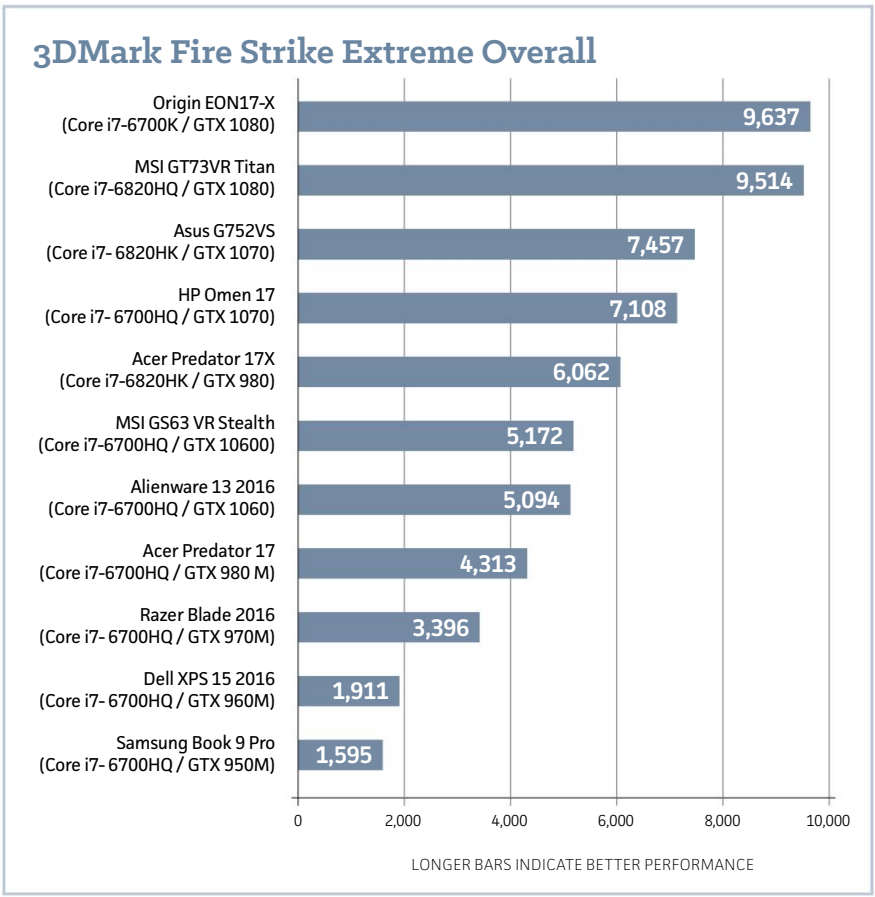
Of course, this laptop has more going for it than its display and chassis. Under the hood you'll find an Intel Core i7-6700HQ—a quad-core mobile part with HyperThreading, for eight logical cores. Its base frequency is 2.6GHz, but it can boost up to 3.5GHz when it needs to. On the GPU front, the 13 packs a GTX 1060 mobile part, which is designed for high frame rates at 1080p with settings cranked. This version of the 1060 comes with 6GB of memory in case you want to game at the panel's native res of 2560x1440.

Our review model also had 16GB of DDR4 RAM running at 2,400MHz, but you can configure one with as little as 8GB if you're on a budget. For storage, it ran a lone 512GB PCIe-NVME SSD from Toshiba, but you can also opt for dual 1TB PCIe SSDs: one for the OS and one for data. When we fired up AS SSD, the drive benchmarked about 1.4GBps in sequential read speeds, and 900MBps write speeds.

Keyboard, trackpad, and speakers

The RGB lighting on the Alienware 13 deserves special mention, since it's got more features than you'd normally expect. Not only can you select the color of zones across the keys, but you can pick the color of the trackpad, the Alienware logo below the display, and the alien head on the lid of the laptop. All in all, it adds up to eight different lighting zones, which is double what is typically offered.

The TactX keyboard is superb. Though it's not mechanical, it has a similar travel and actuation design, with "steel-reinforced" keys (whatever that means). The bottom line is that the keys feel perfect in



my opinion. I typed on this machine all day, and it was glorious.

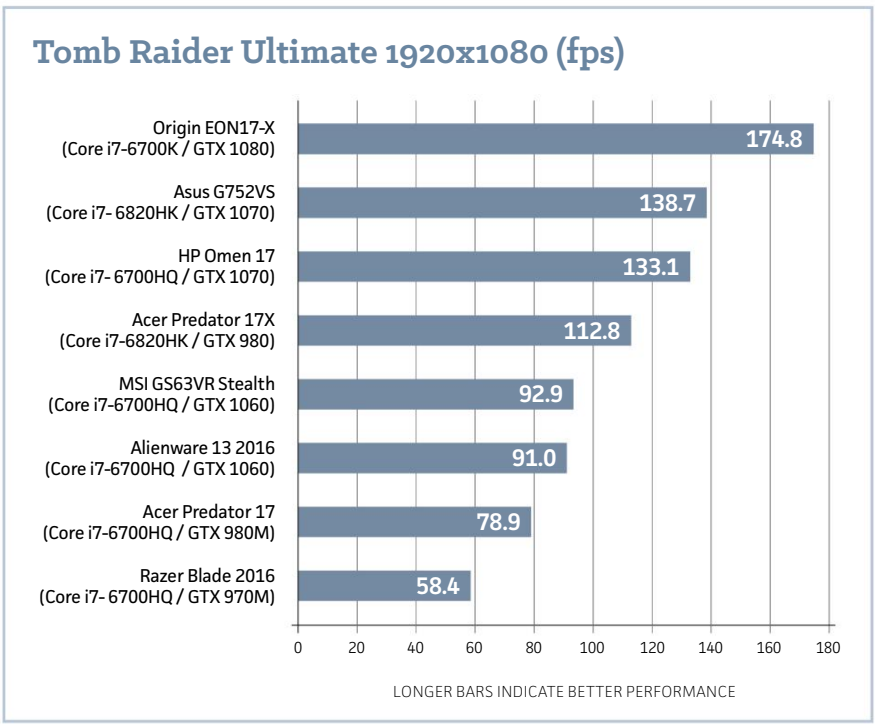
The trackpad is a little skittish for my taste, but reducing its sensitivity helped a lot. Generally, I had no issues using it. It supports gestures, too, and switching from a MacBook Pro's trackpad to this one felt pretty natural.

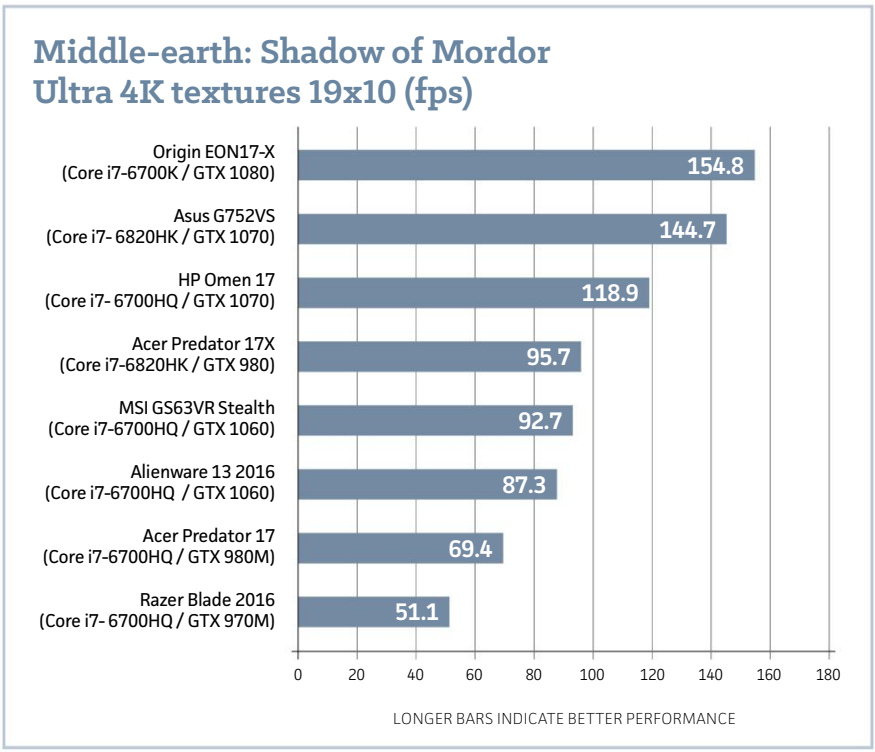
The speaker system is surprisingly good for a laptop this small. Alienware includes sound customization software for both gaming and multimedia, and it's quite effective, allowing you to customize the

sound easily. I was impressed with the overall volume and the clarity among vocals, bass, and midtones. I'm not an audio snob, but I thought these speakers sounded better than the sound systems I've heard on much larger laptops.

Performance

Okay, let's get down to the nitty-gritty. We ran this baby Alien through our usual gauntlet of gaming and CPU tests to see how the overall system held up to torture. We don't have many 13-inch gaming laptops to compare it to, so the benchmark charts include results for bigger systems. Its closest peer here is probably the 15-inch MSI GS63VR Stealth (go.pcworld.com/msigs63vrrev), which has the same CPU and GPU.





3DMark Fire Strike Extreme

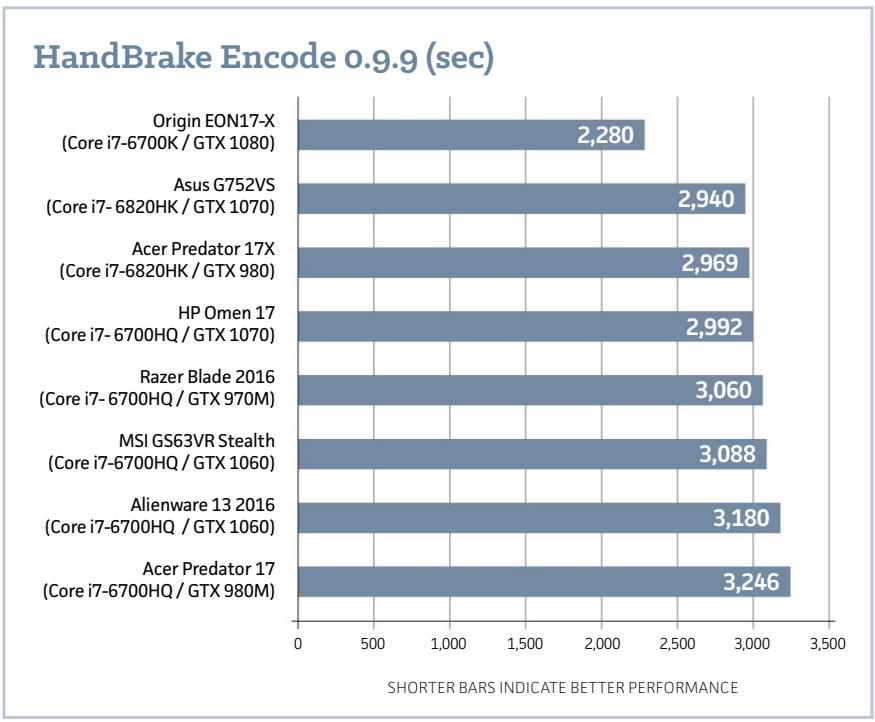
This synthetic test is usually quite accurate in helping sort GPUs by their overall ability. Since the GTX 1060 is a midrange GPU, we're using the Extreme test as opposed to the more gnarly Ultra test.

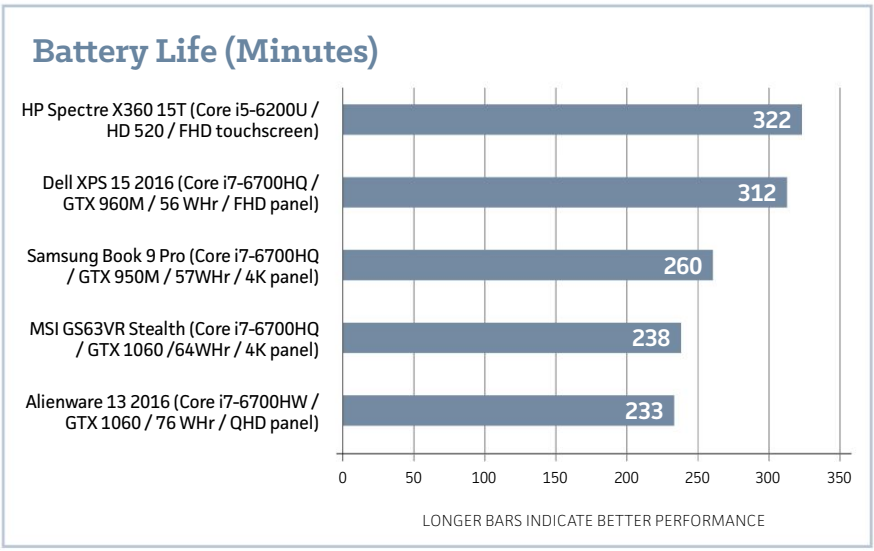
In general, laptops perform as you'd predict in this test, so if there are any irregularities with a laptop's hardware, they usually reveal themselves here. Because the benchmark focuses primarily on GPU performance, we expected the Alienware 13's GTX 1060 to match the performance of other laptops with the same GPU (most notably the MSI GS63VR). As you can see, the two notebooks were extremely close, with the MSI holding a minuscule 1.5 percent advantage, which is within the margin of error for this test.

Tomb Raider

This game has aged, but it can still put some strain on a GPU. Because it's an older game, we run it using the Ultimate preset, which used to be reserved for flagship GPUs but can now be run with cards like the GTX 1060.

Despite the GTX 1060's midrange status, it's still quite powerful, and was able to run this game on Ultimate at 91 frames per second. That's an amazing boost for what you can expect out of these smaller gaming notebooks. Not surprisingly, both GTX 1060 laptops we've tested so far offer the same level of performance, with the MSI notebook running at 93fps.





Middle-earth: Shadow of Mordor

We also tested the Alienware 13 with this newer, more demanding title—its 4K texture pack can gobble up a GPU's onboard memory.

At 1080p, the Alienware 13 still ran this game at 87.3 frames per second. That's plenty awesome, but, again, a bit slower than the MSI GS63VR, which was 5 percent faster despite sporting the same hardware. Perhaps the MSI has better cooling and allowed the GPU to spin up a bit more.

HandBrake

This real-world encoding benchmark is a CPU test through and through, measuring how long it takes a system's processor to chew through a 30GB MKV file and spit out a smaller MP4 file using HandBrake's Android Tablet preset. This test scales well according to clock speeds and core counts—so the more, the better on all fronts. It's also a good test of a notebook's thermal design, as better cooling will allow the CPU to run at higher clock speeds and thus finish the test faster.

The Alienware 13 took 53 minutes to complete this test, again just a tick slower than the MSI GS63VR's 51.5 minutes. This kind of backs up

our theory about the MSI having marginally better cooling, as we noted the Alienware 13 didn't run at its maximum clock speed of 3.5GHz during this test. It instead hummed along at about 3.1GHz for the duration.

Battery Life

Despite its small size, the Alienware 13 packs a hefty 76 watt-hour battery. For comparison, the Origin EON17-X (go.pcworld.com/origineon17xrev), which is the size of a small ocean vessel, has a 79 watt-hour battery, and the MSI GS63VR offers just 65 watt hours. We don't normally pay too much attention to battery life in gaming laptop reviews, but a system this size is certainly designed to be taken on the road, so this information is as important as any about gaming performance.

With the keyboard lights disabled, I ran our 4K video rundown test, which involves playing a 4K movie file on loop until the battery dies. The screen brightness was set between 250 and 260 nits, which is about what you'd set it at in an office environment, and I left audio on with earbuds plugged in.

The Alienware 13 lasted about four hours in this benchmark, which falls into that area between "terrible" and "awesome" from a real-world perspective. However, it's what we expect from a battery of this size, in a machine with this level of hardware. It's certainly long enough for a movie or two on a flight. You won't always have to chain yourself to an outlet, like you would with some ultra-powerful gaming notebooks.

From its slick design to its performance, battery life, and OLED display, it's exceptional in every metric we usually examine.

Conclusion

The Alienware 13 is one sweet little machine. For its size, it's a bit heavy, but in exchange you get an extremely well-rounded laptop that excels in every way possible.

From its slick design to its performance, battery life, and OLED

display, it's exceptional in every metric we usually examine. I'd say the only real "issue" I had with the Alienware 13 is that it can get a bit hot when gaming—enough heat billows out of the chassis that you can feel it on the keyboard. It's not too bad, since most of the heat generates at the top of the laptop, near the display's hinge, and the palm rest never gets warm. But you can feel some warmth on the keys after about 30 minutes of running it under load.

Also, just for fun, I ran a few tests at the panel's 2560x1440 native resolution. If you thought the GTX 1060 was strictly made for 1080p gaming, think again. The 13 ran *Rise of the Tomb Raider* on the highest setting at 42fps, and *Shadow of Mordor* at 60fps on Ultra.

That's amazing for a 5-pound notebook, and though you'll want a set of headphones to block the fan noise, this notebook is an extremely competent mobile battle station. At $2,099, it's expensive, but we'd rather have this than one of the monstrosities that usually populate this product category. We have nothing against ultimate firepower, obviously, but we really like the 13's balance of power, gaming prowess, and portability. That's a difficult balance to achieve, but Alienware has hit the nail on the head this time around.

Google Home: Google puts its A.I. on a nightstand for the win

BY JON PHILLIPS

OK, NOW THIS is clever. That was my reaction when I asked Google Home (madeby.google.com/home), "What's the temperature inside?" and the spunky little assistant replied, "It's currently 73 degrees, but the Nest is set to 65." Google's hyper-aware, voice-activated speaker dishes up a lot of surprising answers, and it's smarter, better sounding, and better looking than Amazon Echo (go.pcworld.com/echorev).

At $129, Google Home also beats the Echo's current price by $51. That's significant, because the two digital assistants promise essentially the same features and benefits. Both stand sentry in a constant state of awareness, listening for voice prompts. Both stream music, Internet radio, and podcasts. Both answer search questions. And both let you control other smart home devices with voice commands.

Google Home and Amazon Echo are the only real competitors in a race to put artificial intelligence on your nightstand, and Google beats Amazon in almost every category by which these gadgets can be judged. So, for me, the question isn't, "Who makes the best tabletop assistant?" but rather, "Will Google stick with Home for the long haul?" Google, as history shows us, has a short attention span for hardware (see Nexus Q, Google Glass, Project Ara and others).

But Google Home is probably different, specifically because it's easy to use, and eminently retail-friendly. So let's dive in and see what it can do. And fair warning: I'll be making frequent comparisons to Amazon Echo, because there's no way to evaluate Google Home in isolation. The two A.I.-driven assistants are just that similar.

Industrial design

Is it a high-end tissue dispenser? Or maybe the world's most advanced personal humidifier? Google

It's impossible to avoid comparisons between Google Home and Amazon Echo. Their mission statements are almost identical.

Google Home

AT A GLANCE

In a two-device race to rule table-top A.I., Google Home bests Amazon Echo in terms of audio quality, microphone range, design aesthetics, and basic intelligence.

PROS

- Looks great, sounds great.
- Category-leading microphone performance.
- Google Assistant is hyper-intelligent.
- Packed with surprise-and-delight features.

CONS

- Plays catch-up to Amazon in third-party device support.
- Still has some learning to do.

$129

★★★★½

Home looks like some kind of indeterminate domestic something-or-other—not elegant enough to be an object d'art, but still tasteful, and clearly designed to integrate with home decor.

The chassis is deceptively small, just 5.6 inches tall, and 3.8 inches in diameter. Sitting on the desk in my home office, I twice caught Home in my peripheral vision and thought it was a carryout coffee cup. I blame the somewhat dingy white exterior. I also wish the cap's delightful dancing lights—which respond whenever you voice an "OK Google prompt"—shined a bit brighter.

But these are just small quibbles. It would be imprudent to say Google Home looks categorically better than the Amazon Echo, but come on. Which is trying harder? One evokes Sharper Image circa 2008, and the other looks like it was styled by Room & Board. Google

How many tech gadgets are covered in fabric? Here we see fabric bases in slate (which comes standard) and mango.

also offers different base options, some in metal, some in fabric. How many gadgets have a fabric exterior? This is progress.

We all have different aesthetics, but I have to give the style nod to Google Home.

Audio quality

If you're looking for a wireless system that can fill an entire home with spectacular sound, you should buy a battery of Sonos speakers. But if you just want to fill a single room with perfectly respectable sound, Google Home's 2-inch driver and dual 2-inch radiators should suffice.

Or to put it another way: If you need a soundtrack for your dinner party, and want to change artists and songs on the fly with voice commands, Google Home is the perfect choice. It doesn't get nearly as loud as Amazon Echo, but it does deliver richer audio. Its highs, mids, and lows simply sound more balanced, whereas the Echo sounds a bit

Google Home doesn't get as loud as Amazon Echo—but it delivers richer sound, and it doesn't distort at high volumes.

Depending on your angle of approach, Google Home assumes different shapes.

thin and over-digitized. Home also sounds clean when its volume is set to 10, whereas the Echo distorts horribly at its highest volume levels.

For music playback, Google Home currently supports Google Play Music, YouTube Music, Spotify, and Pandora. TuneIn, meanwhile, handles live streaming radio and podcast content. Summoning specific artists, music tracks, radio stations and talk shows is a simple matter of voicing an "OK Google" command.

Microphone performance

Both Home and Echo feature far-field microphones that pick up voice commands under challenging conditions. Google goes with dual mics, but Amazon has an array of seven. Apparently sheer firepower can't win this battle, because while Amazon's mic performance is impressive, Google's implementation is stunning.

Witness: I put both hardware assistants in the sun room in the very back of my house. I then left the sun room, walked through an

adjoining bedroom, and headed down a hallway to the living room. It's a serpentine journey with a bunch of walls and open doors in between. Using my normal, non-shouty indoor voice, both Google Home and Amazon Echo could hear my voice commands from various points in the hallway—but Google Home's microphone range was about 10 feet longer. It became vividly clear that the Echo couldn't hear me unless I was closer to the nearest open door.

The next experiment was even more telling. With a Dyson vacuum cleaner going full-blast in the sun room, I prompted Google Home to play a music track. Its microphone heard my command, and started playing the track—this with the vacuum blaring just inches away. I next turned Google Home's speaker to its maximum setting, and voiced a stop music command. The microphones picked up the prompt and stopped the music. I was duly impressed: Neither the vacuum cleaner nor Home's speaker playing at full volume could overpower Google's microphones.

But Amazon Echo couldn't deliver the same results in the exact same test scenario. It heard the same "play Katy Perry Teenage

Google Home looks even better in profile.

Dream" voice prompt over the din of the vacuum, but it couldn't hear my stop command. So I turned the vacuum off, and tried stopping the music again. No dice—the Echo's microphone couldn't even cut through the noise of its own speaker. I finally had to get right above the Echo and scream at it to make the music stop.

Digital Assistance

Google Home is basically a table-top manifestation of Google Assistant, the same AI engine that powers the new Pixel phones (go.pcworld.com/pixellove). Like on the smartphones, you can ask Google Assistant questions and tell it to do things, whether they concern the world at large, or your personal knowledge graph. I was frequently impressed by Google Home's intelligence, but because Google Assistant sometimes seems so smart, it can be a letdown when it fails to deliver results.

Nonetheless, Google Home usually beat Amazon Echo (which uses

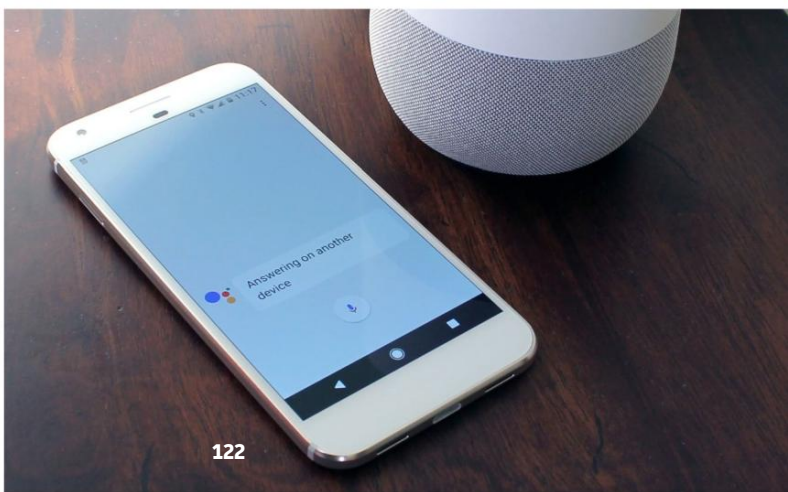
Microsoft Bing for search) in terms of basic worldly knowledge.

Using the ever-repetitive "OK Google" prompt, I asked Google Home to tell me the box score for a just-finished Warriors game. It named Golden State's opponent and the final score, but when I asked, "Who was the leading scorer?" it replied, "Sorry I don't know how to help with that." Still, Home's reply was better than nothing, as the Echo couldn't even give me a simple score report.

How about translation? I asked Google Home, "How do you say, 'Where is the nearest coffee shop?' in German?" It replied with a direct translation. Then I asked, "How do you say it in Thai?" Google Home gave me the Thai translation, understanding that I was still asking for translations about coffee reconnaissance. As for the Echo, it replied, "Hmm, I don't know" to the German query, and then pointed me to Bing search.

As Google vividly demonstrated when it revealed Google Home in October, you can ask, "OK Google, tell me about my day," and you'll get a personalized audio report on your local weather, your commute to work, your next calendar commitment, and pending reminders. It's nice to wake up and get all this information in a flash, but if you have your phone on your bed table, it will spring to life, jump into Google Assistant, and silently reply "Answering on another device." This behavior happens every time you query "OK Google" with both Home and your phone in the same room. And it's annoying.

Google is still working out the kinks, but I'm willing to suffer a few inconveniences for what Google Assistant (and thus Google Home) can deliver. Voice "OK



This is the Assistant message that appears on your phone every time you issue a command to Google Home.

Google, add beer to my shopping list," and a list in Google Keep instantly updates. Ask "What's my commute look like?" and you'll get a basic traffic report, suggestions for an alternate route, and estimated travel time by car.

Amazon's Echo can also help with shopping lists, calendars, and navigation, but you have to deliberately link other accounts for this functionality, and it can be a hassle. Google Home, meanwhile, simply dips into your existing Google account. It's easy and seamless—and that's a big plus for all the tech newbies who might receive Google Home as a Christmas gift.

I was surprised that Home couldn't recite the latest presidential polling results, while the Echo pulled that data from RealClearPolitics. But never forget: Artificial intelligence is in a constant state of becoming. Both Google Assistant and Amazon's Bing-powered system will only get smarter, and Google has a big advantage here. It develops and controls the very A.I. platform on which its hardware depends, and its software services are already built into every Android phone. So if you don't think Google Home's core intelligence will quickly outpace the Echo's, you just don't understand how technology works.

Google Home can switch your TV from the cable box to Chromecast, and begin playing YouTube—all with a single voice prompt.

Smart home control

Voice-activated hardware assistants like Google Home and Amazon Echo are perfect for controlling smart home devices. With Home on my night table, I can ask for the temperature inside my house, and then prompt my connected Nest thermostat to turn up the heat to

70 degrees—all from the comfort of my bed, and all via voice prompts.

It's a wonderful luxury, and when Google Home does home control, it does it well. It just doesn't support as many smart home devices and platforms as Amazon Echo. Nor does Google Home have sibling devices that extend Google Assistant to various locations throughout the house.

Currently, Google Home supports the Nest thermostat, Google Chromecast, Philips Hue smart bulbs, Samsung's SmartThings platform, and IFTTT recipies. Google is working on a software development platform that will allow other hardware manufacturers to connect with Google Home, but that won't be ready until next year. That's a shame because if Amazon shows us anything, it's that devices like Echo beckon a Jetsonesque future.

Consider the set-up of Michael Brown, TechHive's executive editor. He has an Echo in one room, and five Echo Dots (go.pcworld.com/echodot) (essentially baby Echos) strewn throughout his house. Because the Echos support Vivint's smart home platform, Michael can use the six Echo devices to control 31 different Leviton light switches; various Kwikset smart locks; his smart garage door; his Nest thermostat; and his home security system.

His Echos are also linked to a Harmony Elite universal remote for controlling an entertainment system. And remember: All of this is driven

Google Home can remain rather anonymous around strangers—until it starts talking back.

No, it's not a high-tech humidifier. It's Google Assistant in its table-top splendor.

by voice control. It's a wonder that Michael ever gets off his couch at all.

Set-ups like this underscore Google's shortcomings in home control. But they also illustrate a bright future ahead. And, to be sure, I saw glimmers of smart-home excellence during Google Home testing. As I've already shared, Nest thermostat control is excellent. But what I discovered with Chromecast support was downright amazing.

I was watching the Warriors game over my cable box on a Samsung TV. I voiced, "OK Google, play YouTube on Chromecast," and the TV magically switched the input source from my Xfinity DVR to the Chromecast, and kicked into my YouTube account. I almost did a double-take.

Now, I definitely expected reliable voice control once inside Chromecast's YouTube app, but input switching? My Google contact explained that Chromecast and Samsung both support CEC switching (go.pcworld.com/cecswitch), but I had never experienced this technology trick until Google brought it home.

A splendid version one effort

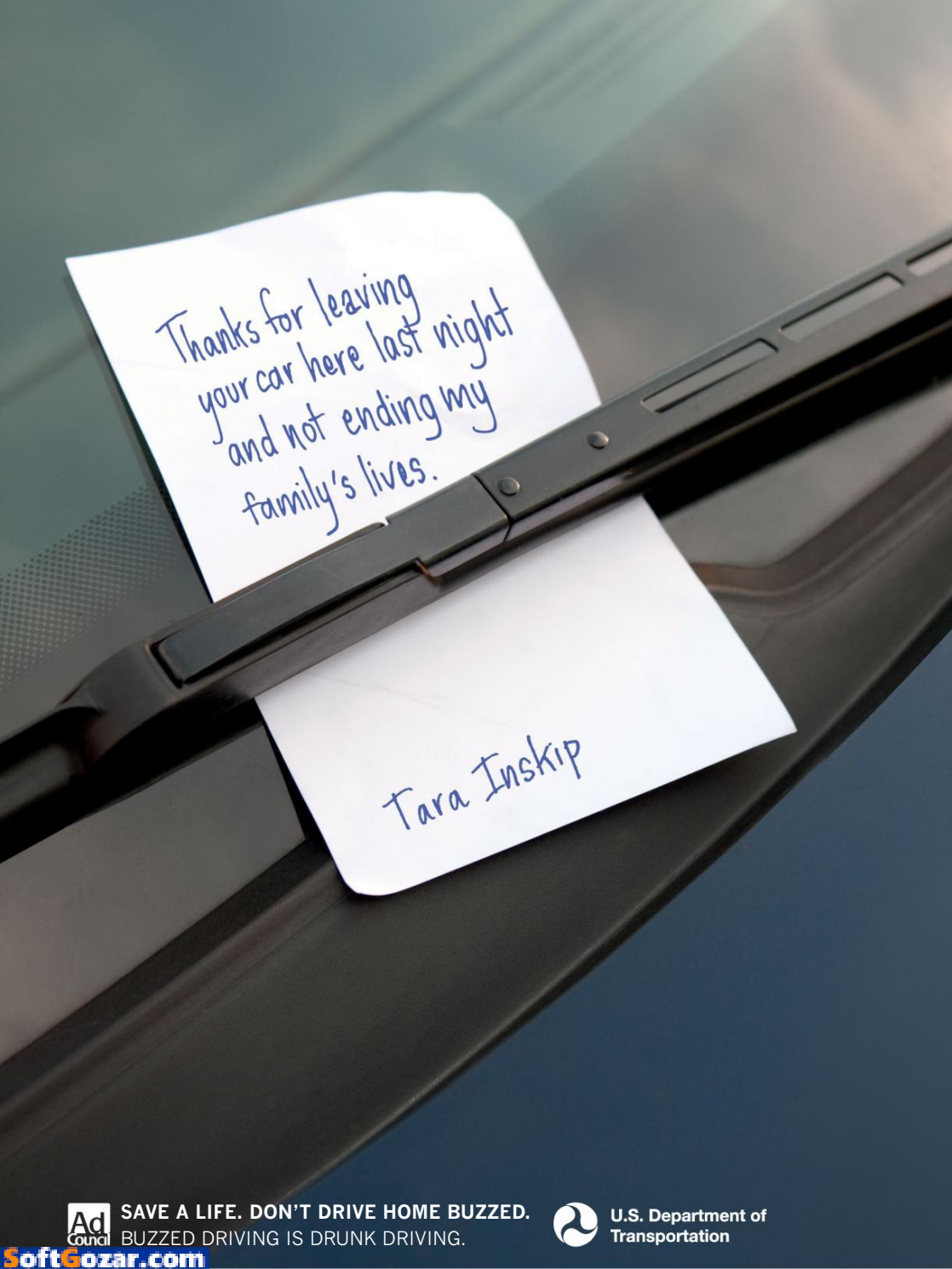
There's still work ahead for the Google Home team. Google needs to support all the smart home platforms that the Echo supports, and

Google Home could still learn a few tricks for the devices it does control. For example, Home can instantly switch from my cable box to Chromecast, but it's incapable of switching back.

Google Assistant could also stand to get even smarter. It still can't send text messages or emails, it can't recognize more than a single Google account, and it can't differentiate different users (go.pcworld.com/googhomeflaw) according to their voice patterns.

Still, these are still early days for Google Home, and its fit, finish, and user experience is great for a version one effort. Now it's just incumbent upon Google to maintain forward momentum, and not treat Home as just another hardware experiment. Amazon has already iterated on the Echo twice since it was first released to a broad audience in June 2015. And now with Home making such a grand entrance, we have to expect Amazon price drops, and a spectacular Echo reboot sometime soon.

Well, at least a hardware reboot. There's no way in hell that Google will ever license out Google Assistant. 



Lenovo's ThinkPad X1 Tablet modules add features but limit functionality

BY MARK HACHMAN

WE GAVE LENOVO'S ThinkPad X1 tablet high marks (go.pcworld.com/thinkpadx1rev) not for its performance, but for the elegance of its design. We still have mixed opinions on its three related productivity modules, due to price, performance, and some small plastic bits that you'll have to be careful not to lose.

Modularity has emerged as a theme for Lenovo, home of the Moto Mods (go.pcworld.com/motomods) and Thinkpad Stack (go.pcworld.com/thinkpadstackrev) modular accessories. Now a series of three "modules" do the same for the Lenovo X1 Tablet: the $150 Productivity module, the $280 Presenter module, and the $220 3D Imaging module. Lenovo shipped us the first two, which we didn't

The small modules clip into the bottom of the tablet, where the keyboard would normally fit. Two clamps are also on the rear of the Presenter module, shown here.

have at the time of our X1 tablet review.

Think of Lenovo's three modules as a utility belt of sorts for business users (although there's nothing stopping consumers from buying them): small, purpose-built gadgets that expand the capabilities of the X1 with a minimum of fuss. It's a smart concept, but Lenovo's dedication to a clean aesthetic makes the modules less useful. We thought that the modules couldn't be used outside of tablet mode, which an instruction manual implies. That was incorrect—but there's still some odd plastic bits that you'll need to be careful not to lose.

How it works

To use the modules, you have to first remove a thin sheath of plastic clipped to the base of the X1 tablet via a sliding latch. This exposes tabs on the tablet's edge; metal clips on the modules slide into these tabs and a pair of clamps provide additional support. The pogo pins that normally connect to the excellent X1 keyboard now serve as the modules' interface. Take care when setting aside the thin plastic sheath: If you break it or lose it, you can't easily reattach the keyboard.

What we didn't immediately notice, however, was that the ThinkPad bumper in the center of each module is a cutout of sorts. Remove it, and it exposes the necessary pins that connect to the keyboard. Lenovo's one-page manual (go.pcworld.com/lenovomanual) for its presenter module doesn't indicate the "ThinkPad" cutout can be removed. No, there is no page 2.

Presenter module: A pico projector in a can

The Presenter module turns your tablet into a projector. It's a neat trick to flip the tablet on its back, prop it up using the kickstand, then

swivel out the projector module to point it at a wall or other suitable surface. An internal battery stores enough juice for two hours of projection time.

Tap the power button, and the projector warms up. In a second or two, it throws a small square of light onto the projection surface, performing automatic keystone adjustment to align the image properly. Alternatively, an HDMI toggle—the module can either display an HDMI signal from another source, or else project the tablet's screen—allows for an external display.

Unfortunately, the Presenter module is hamstrung by a lack of luminosity. With just 28 to 32 lumens of power available, the module's projected image is only truly readable in a dim to dark room. With virtually any ambient light, the image is washed out. Even in a darkened room, the projected image is just subpar. Worse still, Lenovo says the module can only cast a 60-inch display at 6.5 feet, with a rather poor 854x480 resolution.

To be fair, many, but not all, of the dedicated external pico projectors you'll find elsewhere offer roughly the same luminosity and resolution. But for the $280 you'll pay for the Presenter module, you could get an external model like the iCODIS G1 (go.pcworld.com/icodisg1), which offers the same resolution, but at 100 lumens.

My impressions of the Presenter module: You have a dim, low-resolution display projected just a few feet in front of a bright, high-resolution laptop screen. Why not just huddle around the laptop?

The Presenter module's pico projector mount swivels to protect the lens when not in use. Here, it's ready to go.

Lenovo's Presenter module, at night, projected against the wall. Compare this image with the one below, shot in the same room but during a cloudy day.

Productivity module: A hefty chunk of battery life

Lenovo's Productivity module is much more straightforward. The most important element is a 2-cell battery for an additional five hours of battery life, an HDMI connection, a USB 3.0 connection, and a Onelink port. The latter is the connection Lenovo uses for its docking stations...so we have a modular accessory that can connect to a dock that can connect to other modular accessories, like a monitor or hard drive. Flexibility!

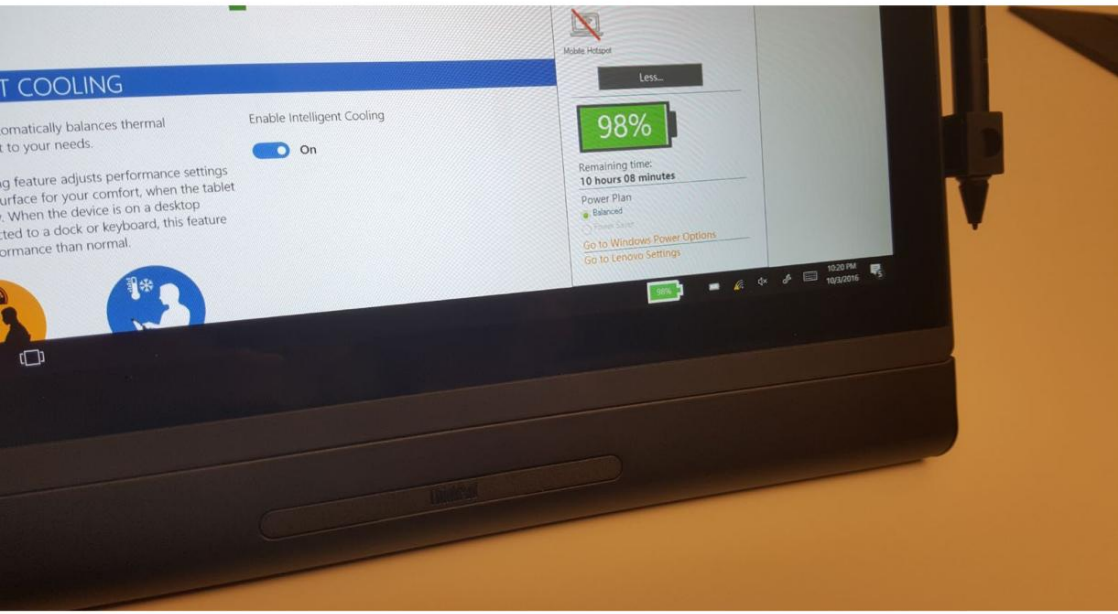
When using the modules, be careful not to lose the cutouts. (USB key shown to provide scale.)

Here, the productivity module is more useful, because the battery simply extends the battery life of the tablet itself: very similar to the "barrel batteries" ThinkPad owners have been able to buy for years.

Finally, for those who have a hankering to scan 3D objects or measure virtual spaces, Lenovo provides the 3D Imaging module, with

an embedded Intel RealSense camera built in. That's aimed at a much narrower niche than the other two modules, and wasn't available for us to try out.

The Lenovo X1 Tablet remains one of our favorite two-in-one devices, not least because of the care Lenovo took in its engineering. We're happy to see that some of that care extends to the modules, in that they can be use used with the keyboard. We originally characterized the lack of keyboard support as a fatal flaw. Now that that's been clarified, I think it's fair to say that the Productivity module's battery is a helpful, worthwhile addition. But the lack of luminosity in the Presenter module—and those annoying little plastic bits—might give you pause.



All three modules connect to the X1, but only in tablet mode. Still, the total battery life (an estimated 10-plus hours, in this shot) might be worth the inconvenience.

Titanfall 2: Prepare for more mech-dropping, wall-running action

BY HAYDEN DINGMAN

BEFORE WE GET started, let's just all agree that releasing *Titanfall 2* the week between *Battlefield 1* (which is quite good; go.pcworld.com/battlefield1rev) and *Call of Duty: Dumb Subtitle* (which will sell regardless) was a terrible, horrible, no good, very bad idea. Such an awful idea that I kept expecting EA to last-minute delay *Titanfall 2* to... pretty much any other month.

No such luck. *Titanfall 2* releases as scheduled, in between two juggernaut shooters (one of which is also published by EA), and it's a bad omen for a sequel to a game that's world-renowned for rapidly losing its multiplayer audience the first time around.

So I am admittedly skeptical whether *Titanfall 2* will have a multiplayer community in a few months. Respawn's biggest ploy is that all upcoming maps and DLC will be free, and it's admittedly enticing. But we'll see.

With that bit of bookkeeping out of the way: Let's talk specifics.

Multiplayer

Titanfall 2 is still primarily a multiplayer game. Sure, there's an actual campaign to play this time, but the game's roots lie in the dual infantry-and-mech combat established by the first outing.

It survives relatively unscathed. *Titanfall 2* is a spectacle in action, on-foot Pilots sprinting down alleyways and running up the sides of buildings while hulking Titans shoot oversized rockets and lasers at each other in the streets below. It's a dynamic I loved in the original, and I've been happy to sink some hours into a sequel.

Some of the beta's more egregious changes have been rolled back, too—particularly the method by which Titans spawn. Early in the beta, *Titanfall 2* had it set up so that Titans were earned only through kills, greatly reducing their prevalence. Now it's (as far as I can tell) some combination of kills and time, with raucous three-on-three Titan battles a common occurrence.

The other big complaint coming out of the beta was that Titans no longer have shields, and unfortunately this aspect survived through release. Instead of a rechargeable shield you can now steal batteries from enemy Titans and plug them into your own for a quick repair, but it's a huge pain to pull off and has barely factored into my matches so far. Maybe when people get more accustomed to the game we'll see more of it.

Titanfall 2

AT A GLANCE

Titanfall's second outing has more to offer than the original, but the novelty's worn off a bit and the singleplayer campaign waffles between brilliant and boring.

PROS

- Creative approach to a singleplayer campaign
- Same mech-and-pilot multiplayer as the original
- More character customization gives multiplayer some staying power

CONS

- Campaign's writing is painfully generic
- Uninspired multiplayer maps
- Too many multiplayer modes, many which overlap

$60

★★★½☆

The immediate outcome of that design decision is that Titans feel altogether too fragile. Being outnumbered is an immediate death sentence, and unless teams coordinate their Titans (which will never happen in public matches) it means easy pickings for the enemy.

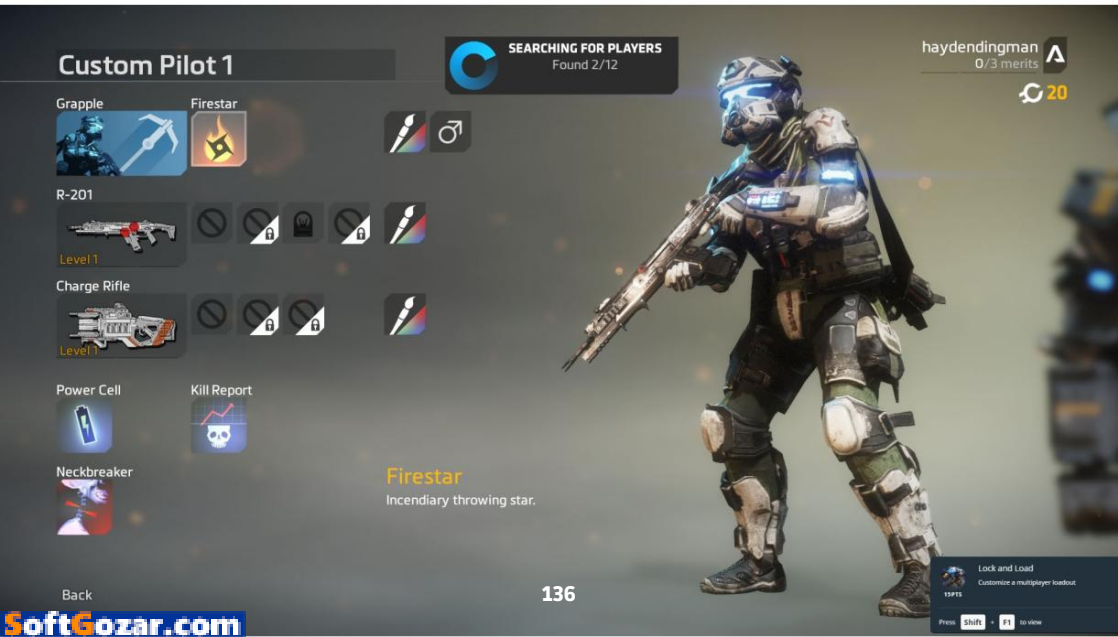
I'm having a decent time, regardless. I do appreciate how much Respawn bolstered the customization/load-out part of the game, as

that was one of my main criticisms in the first. Titans now come in six varieties, including one that wields a sword and one that spews fire. Pilots have a similarly broad range of weapons, each with some sort of stupid gimmick to differentiate them. (The one that made me laugh hardest is a gun with horizontal recoil.) You can also change the color or pattern of just about everything, which adds to the "It's mine" factor.

Oh, and instead of grenades you can equip flame-spewing shuriken. It's absurd and amazing.

But at its core it's *Titanfall*, for better and worse. The AI grunts in the default Attrition and Bounty Hunt modes are still dumb cannon fodder, there are too many modes with too few players, and the maps are lovely but feel sort of interchangeable after playing through them (except for the meat grinder that is Crash Site).

My biggest complaint is that the 12-person cap on most modes returns, making larger areas feel awkwardly empty. Like last time, I have to imagine the low player count is due to consoles, and again like last time I'm left wishing the PC version ramped to a more chaotic 16- or 20-player load. I firmly believe it would be more interesting, especially



given how gigantic the maps are (to allow for Titan-on-Titan fights) and how much time you spend running back to the action as a lowly Pilot.

Singleplayer

Enough about multiplayer. The biggest addition to *Titanfall 2* is, as I mentioned earlier, an honest-to-goodness singleplayer campaign, drawing on Respawn's ex-Infinity Ward DNA to create something that feels remarkably like mecha-Call of Duty. World-ending stakes, big explosions, no-time-to-chat as you blast your way through a bunch of linear environments.

To its credit, they're pretty creative environments. Over the course of six or so hours, *Titanfall 2*'s campaign explores every permeation of its core mechanics: shooter, mech-shooter, and platformer, all combined and re-combined in various ways.

And this experimentation leads to *Titanfall 2*'s most memorable moments. There's a level where you reposition bits of scenery with huge cranes, creating paths for your pilot to run between enemy-infested platforms. Another has you navigating a massive factory, engaging in shootouts while trying to avoid being crushed by the assembly lines. A third has you scrambling across the hull of a

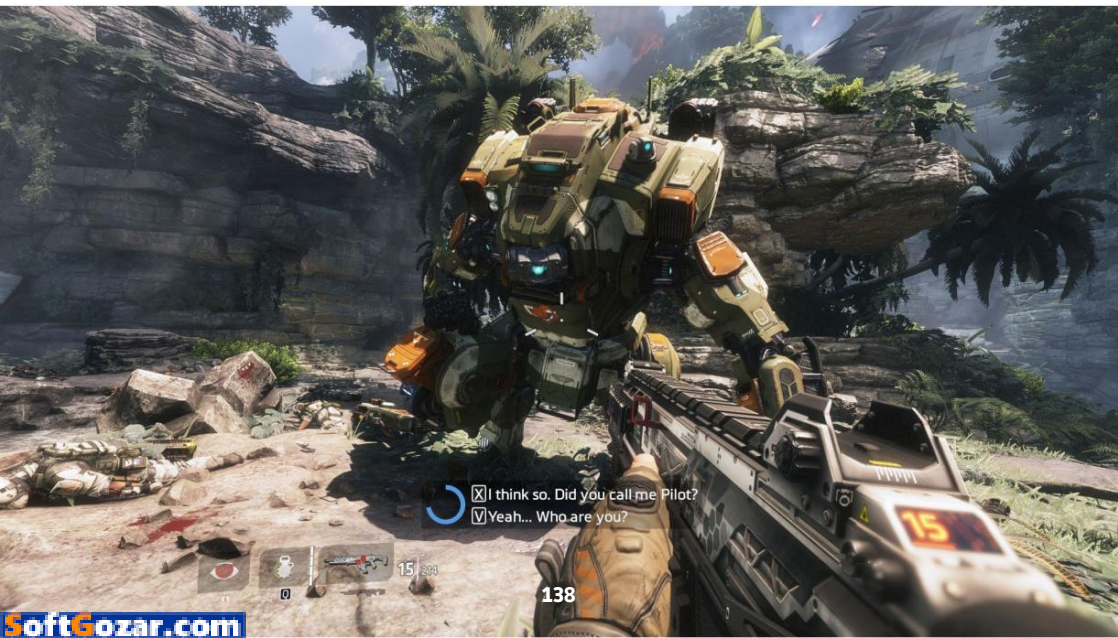
spaceship trying to take out its thumping gun batteries.

These sprawling vistas are a treat because they remind you that you're playing *Titanfall*. Your pilot's mobility is begging to be used, and ironically it's these levels—which often rely on your wall-running skills more than your guns, like a bizarre homage to *Mirror's Edge*—that best take advantage of the series's unique strengths.

Not every experiment is successful. Some levels (especially the first few) drag on too long, a series of tedious Titan-on-Titan boss battles kill the pacing, and I wish there were more difficult platforming sections included. Also, the brilliant environments are undercut by some of the dumbest AI to grace a shooter since...well, the original *Titanfall*. But overall, *Titanfall 2*'s campaign is wildly creative when taken from a level design standpoint.

From a writing standpoint? Not so much.

You play as Jack Cooper, a young and untested Rifleman in the Militia. As Cooper, you're sent to the planet (or moon?) Typhon, there to investigate an IMC presence and take out the enemy stronghold. Unfortunately your grizzled old mentor (since five minutes ago) is



killed in the opening salvo, and you're left to take over his Titan and "Uphold the mission."

If you want any more background—say, "Who is the Militia?" or "Who is the IMC?" or "Why are we at war?"—too bad. Without even a "Previously on..." to tide you over, *Titanfall 2* just assumes you remember its predecessor's lore, which is maybe one of the weirdest assumptions ever made by a video game sequel.

Did you play the original *Titanfall*'s campaign? If not, I would've said you hadn't missed anything. It essentially threw you into a series of multiplayer matches, except random voice actors read lines of dialogue during the midst of battle. At best, it was boring. At worst, it was incomprehensible.

But *Titanfall 2* doesn't really bother to bring you up to speed. It just points you at the generic rent-a-bad-guys and says "Fire at will," filling in the gaps later with over-the-top villain dialogue—especially one three-minute long audio log (yes, it's only audible if you stand in place and listen to it) where the IMC's head General repeats ad nauseum "Human life to a certain extent is expendable."

It's so cliché as to almost be hilarious—which I think might be the point. All the villains are one-note caricatures, including an Austrian-accented mercenary named Richter who says "Don't try so hard to be

a hero. You'll live longer." A villain who parodies Arnold Schwarzenegger? Yeah, I think there's a bit of Saturday morning cartoon-style silliness here.

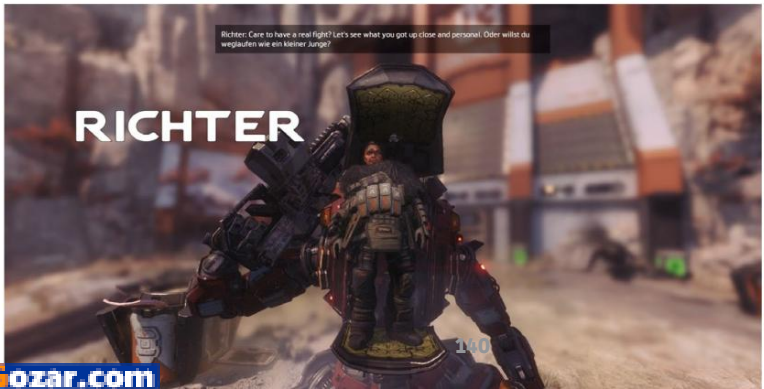
Your relationship with your Titan is similarly cheesy, taking on a sort-of buddy cop feel. The writing relies a bit much on the overplayed robot-doesn't-understand-human-idioms joke, but ultimately the partnership between you and BT-7274 is the story's peak, with a lightweight dialogue-choosing system injecting some life into your otherwise-bland character.

It's not great, okay? It's not. *Titanfall 2*'s campaign is a pastiche of other, better sci-fi—be it game, film, or book. It's predictable to a fault, often generic, and the voice acting is hit-or-miss. But it makes for a decent night or two of dumb, mindless action with a friendly robot buddy. I'd say it's worth playing through, if only to see some of the more creative ideas Respawn's packed into the levels themselves.

Bottom line

I wish we'd gotten *Titanfall 2* the first time around. The multiplayer is as unique as ever, and the addition of a singleplayer campaign (however brief) helps to pad out the game and give its best ideas more room to breathe. Not everything works—least of all the writing—but if nothing else Respawn proves it's a studio willing to experiment, to push boundaries in a way *Battlefield* and *Call of Duty* largely stopped doing years ago. That makes *Titanfall 2* interesting, despite its flaws.

Now cross your fingers people stick around this time.



Samsung KS9800 4K UHD, 65-inch smart TV: Quantum dots + HDR = Wow!

BY JON L. JACOBI

WE GET PITCHED on a lot of new products and technologies here at TechHive. Every now and then, something great pops up. But most of the better mousetraps we see are over-hyped and/or relatively trivial. You might say we've become a bit jaded about it.

So when I pulled my colleagues aside and asked them to take a look at Samsung's UN65KS9800 65-inch, 4K UHD smart TV with HDR support, I heard a lot of muttering along the lines of "4K UHD? HDR? So what? <yawn> $3500? No way I'm paying that for a TV! I'm really busy--can we do this later?"

But when I showed them the stunning vista of the KS9800 displaying 2160p HDR demos, the muttering was replaced by exclamations of "Oh, my." "Wow!" "Whoa!." And at least one "That's freakin' awesome!"

Keep in mind, these aren't high-school kids, but seasoned professional journalists. The combination of HDR's heightened contrast and dynamics and quantum-dot technology elicited the oohs and ahs, not just the extra pixels in the 3840 x 2160 display. In short, the UN65KS9800 made believers out of the 4K UHD and HDR skeptics around here. HDR isn't this year's 3D, it's a genuine improvement in TV technology.

Setup and specs

The UN65KS9800 is a 65-inch class (64.5-inch), 120Hz LCD panel with about a 3-inch curve. The wall weight is around 62 pounds, and the 14-inch-deep stand adds another 7 pounds. There are four HDMI 2.0a inputs, each of which supports HDCP 2.2, and one of which provides ARC (audio return channel) for connecting the TV to an external sound system (a sound bar, an A/V receiver, or what have you).

Those connections are not on the TV itself but in a convenient breakout box that Samsung calls OneConnect+. The box also harbors two USB ports and an RS-232 port for integration with high-end control systems. Only the ethernet, power, a single USB port, and the OneConnect+ cable port reside on the TV itself.

Samsung UNJ55KS9800 4K UHD TV

AT A GLANCE

Color us impressed, and then some. Watching high-quality 4K UHD HDR video on this TV shows what all the fuss is about. It's pricey, but you get what you pay for, or at least you will when more HDR content becomes available.

PROS

- Absolutely stellar picture
- Excellent HDR
- Elegant remote and interface
- Good sound

CONS

- Some backlight blooming with light objects on dark fields
- Curved screen doesn't add much value
- Expensive

$2,998

★★★★½

The TV itself has just three ports, which are covered by a removable panel in this photo. The rest are housed in a breakout box.

The KS9800 is pretty straightforward to set up, but the previous reviewer kept the users' guide, so it was only vague recollection reminding us that the remote control's only infrared function is on/off. To gain access to the rest of its functions during first-time setup, you need to pair the remote and the TV via Bluetooth, using a small, not-easy-to-see button next to the battery on the inside of the remote.

Remote control and user interface

After having dealt with another vendor's somewhat clunky Android interface and old-school remote, using the KS9800 was a joy. The remote sports only a few buttons, feels great in your hand, and the on-screen interface is simple and logically laid out. You can get to the picture settings at any time, and both keyboard (USB and Bluetooth) and mouse are supported. Bluetooth gamepads are supported as well. Our only complaint is the absence of fast-forward and rewind buttons. There is such a thing as too minimal.

There are tons of picture tweaks for the KS9800, including expert

settings for those who are particular about such things (or who can hire a professional to calibrate their TV). A nice touch is being able to set 8/10-bit color individually for each of the four HDMI inputs. Said 10-bit color is the "10" in the HDR-10 standard that Samsung refers to as HDR 1000. The 1000 is to call out the display's supposed maximum brightness of 1000 nits, we're told. We measured 558 nits on a bright white screen with everything maxed out. That's about 100 nits brighter than the best you'll see from most LED/LCD TVs. Perhaps you need to used HDR material to see 1000.

Picture and Sound

The KS9800 features the cream of non-OLED image technologies: quantum dots, full array backlighting, local dimming, and more. The color is fantastic, extremely accurate, and—at least with HDR material--superbly saturated. The TV does a very good job upscaling lower-resolution material as well.

The display you're reading this article on is most likely not capable of showing how good the KS9800 is.

The KS9800's blacks are also outstanding, if not OLED-like; the HDR effect really adds a jolt to the overall experience. Motion is super smooth, too. Lest I sound like a Samsung shill, I did encounter some wide area blooming with light objects on dark backgrounds. But what was annoyingly obvious with the last Samsung SUHD TV I tested is much less noticeable on this one. The effect only rears its head once in a blue moon, but it's a reminder that LED-backlit LCD technology isn't yet perfect.

If you bought one of last year's SUHD TVs and are considering an upgrade, you should be aware that those models can be upgraded to HDMI 2.0a, which is required by HDR-10, and those TVs have the chops to display HDR-10 to good effect.There is no support for Dolby Vision, with its dynamic metadata, in any SUHD TV; and there's no way to know at the moment whether any will be able to handle dynamic metadata in the future. Even if not, HDR-10 looks pretty darn good.

The KS9800 not only has one of the best pictures in the industry, it's also one of the best-sounding TVs we've heard, putting out decent bass and treble and good definition. The upshot is that you probably won't feel instantly compelled to supplement it with an A/V receiver, sound bar (go.pcworld.com/soundbartv), or home theater in a box (go.pcworld.com/hometheaterbox). The onboard amp is a rather hefty 60-watt 4.2 channel type, and the TV can decode Dolby Digital Plus, DTS Premium Sound 5.1, and DTS Studio sound. There is no support for the high-definition codecs used on Blu-ray discs, such as Dolby TrueHD, DTS HD Master Audio, or the object-oriented Dolby Atmos or DTS:X (go.pcworld.com/dolbyatmos).

In this profile photo, the 3.0-inch curve in the KS9800's chassis makes the TV look thicker than it actually is.

Conclusion

Okay, $3500 ain't chicken feed. But the KS9800 gives OLED a run for its money in terms of color and contrast; and from what I've seen, it shows fine detail considerably better. The blacks aren't quite as dark, but HDR content makes this difference barely noticeable.

I can't tell you how much you want to spend, or if it's the right time to go HDR in a world still dominated by 720/1080p, standard dynamic range content. But I can tell you that when real 4K UHD HDR content starts replacing the overly compressed or upscaled 1080 junk currently being streamed, you won't be sorry you bought a KS9800.

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HANDS-ON:

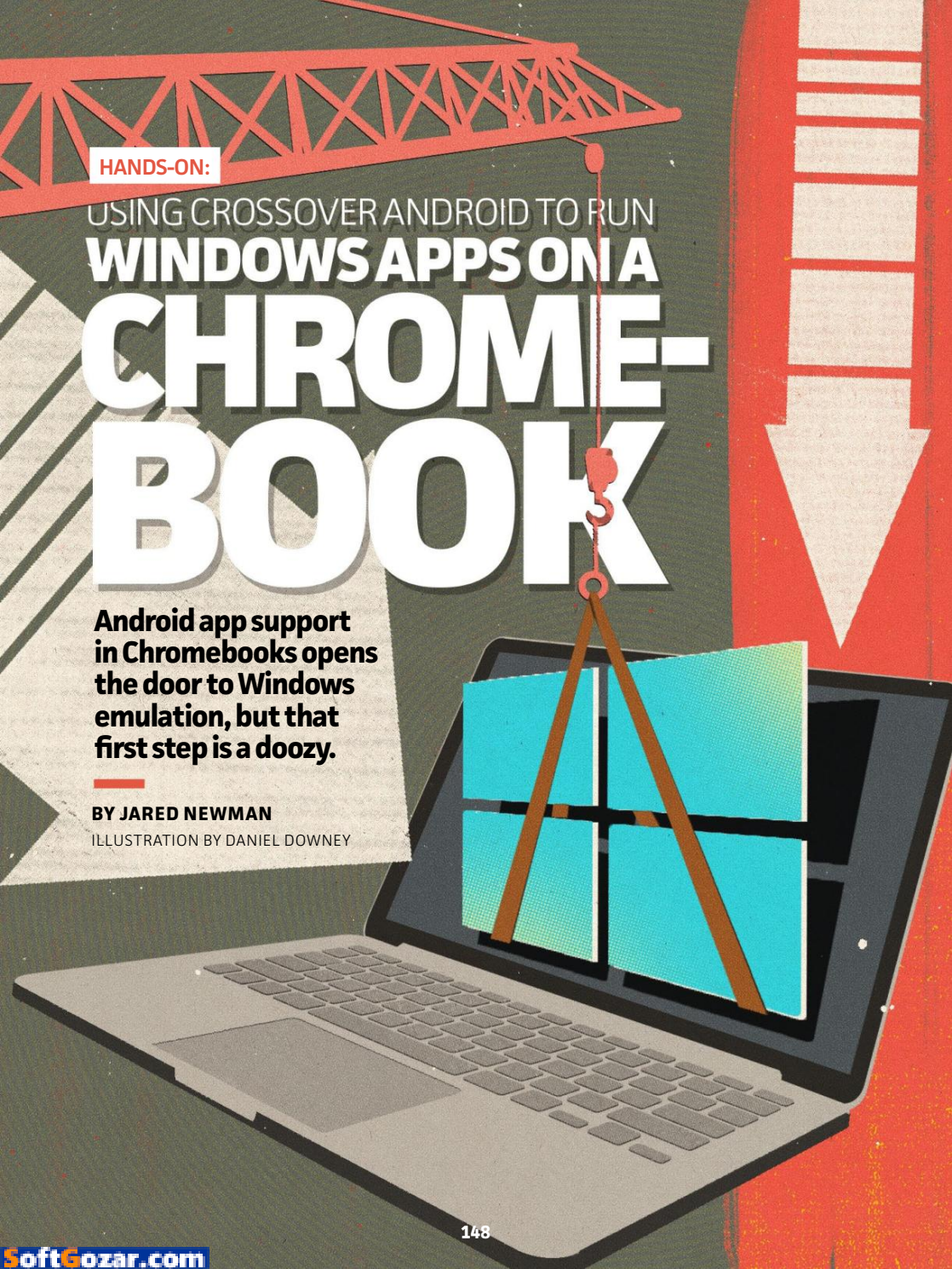
USING CROSSOVER ANDROID TO RUN

WINDOWS APPS ON A CHROME-BOOK

Android app support in Chromebooks opens the door to Windows emulation, but that first step is a doozy.

BY JARED NEWMAN

ILLUSTRATION BY DANIEL DOWNEY



Switching from a Windows laptop to a Chromebook is possible only if you can live without any Windows programs.

But Chrome OS's newfound support for Android apps from the Google Play Store has opened up a loophole: A program from Codeweavers called CrossOver Android creates a Windows compatibility layer inside Chrome OS, letting users install and run traditional Win32 software.

As a proof of concept, this is an exciting development for prospective Chromebook owners. But CrossOver is still early in its development. As I discovered while testing out a preview version, getting your favorite Windows programs to work involves an unfavorable roll of the dice.

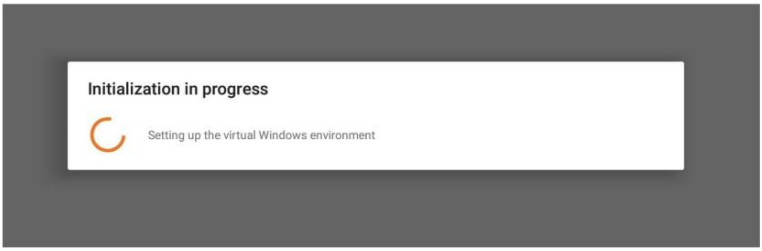
CROSSING OVER TO WINDOWS

CrossOver Android is based on Wine, the decades-old software that can run Windows programs inside of Linux, Mac, FreeBSD, and Solaris. Codeweavers, the company behind CrossOver Android, currently makes its living building user-friendly features on top of Wine and selling the product to Linux and Mac users.

Development on the new Android version of CrossOver began earlier this year, but the software isn't widely available yet. To access the preview, you must request a sign-up through the Codeweavers website, providing the email address associated with your Google Play Store account. That invite may take several days to arrive.

Even if you have an invite, you still need a Chromebook that supports Android apps from the Google Play Store. Right now, that includes the Asus Chromebook Flip, Acer Chromebook R11 (or C738T), and the Google Chromebook Pixel (2015 model). Many more Chromebooks will get Android app support later this year or next year.

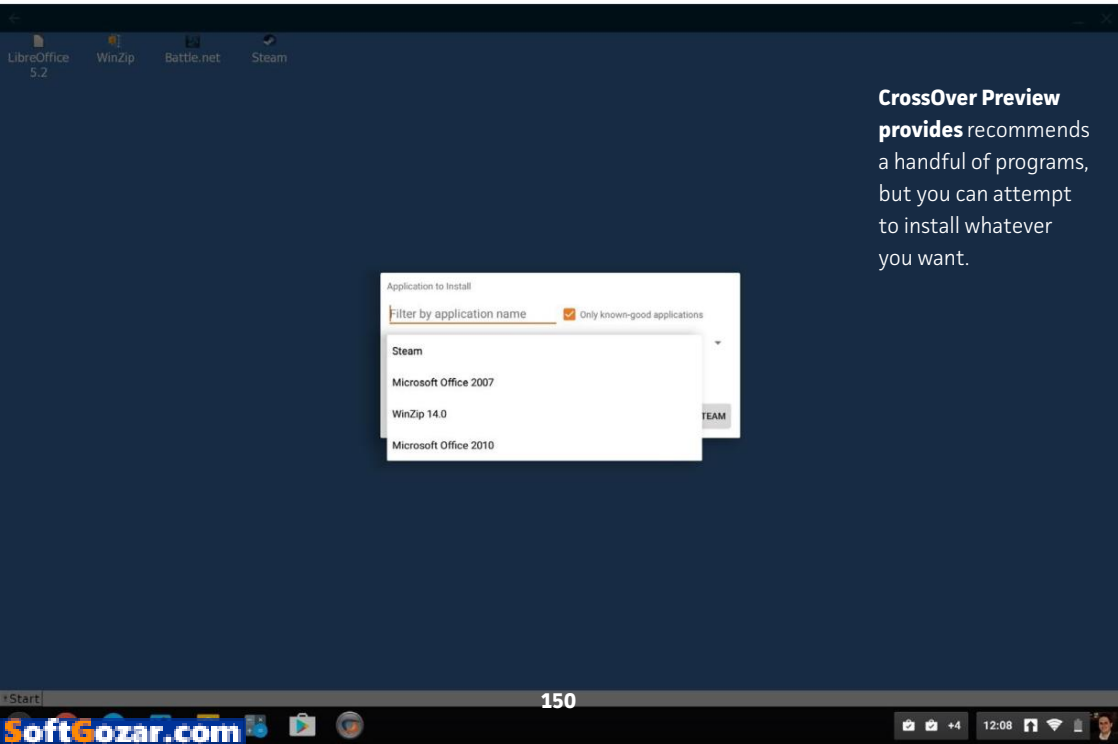
Fortunately, there's no trickery involved in installing CrossOver Preview on a supported Chromebook. Clicking the invite link in your



CrossOver is an Android app that creates a Windows-like environment for running desktop software.

email takes you to a Google Play Store listing, where you can opt into the beta program and then download the Android app like you would any other.

As with Wine proper, CrossOver doesn't require a copy of Windows. Instead, it opens up a Windows-like environment that vaguely resembles Microsoft's operating system, with a Start menu in the bottom left corner and a desktop for app icons. A notepad, file



CrossOver Preview provides recommends a handful of programs, but you can attempt to install whatever you want.

explorer, and command prompt are built in, along with a bare-bones Control Panel for adjusting Internet settings, configuring game controllers, and removing programs.

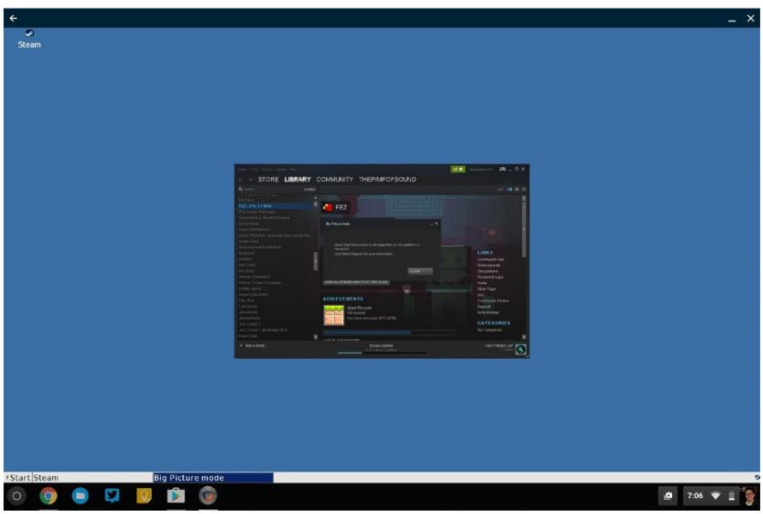
At startup, you'll see a prompt to install one of several apps: Steam, Office 2007, Office 2010, or WinZip. Both Steam and WinZip download and install themselves automatically, along with any related software that's necessary to run them. For Office, you must provide your own installation files.

You're not relegated to just those apps, though. Within the software install menu, you can uncheck Only Known-Good Applications and choose from a long list of other programs. CrossOver also includes a file browser, from which you can launch any .EXE or .MSI install file that you've downloaded onto the Chromebook.

That's where things start to go off the rails.

SOME HITS, MOSTLY MISSES

I tested CrossOver Preview on a 2015 Chromebook Pixel, which immediately presented a challenge: The 2560x1700 resolution display of Google's luxury laptop resulted in small application windows with

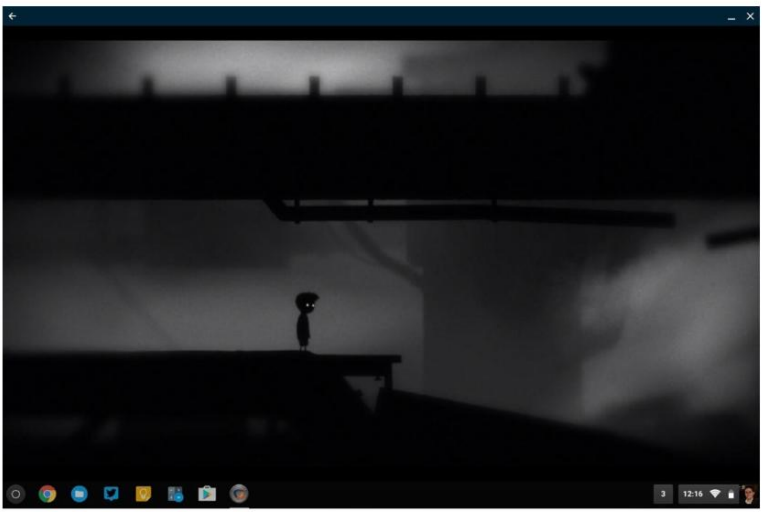


Steam running on a Chromebook Pixel in CrossOver Preview.

tiny, sometimes out-of-whack text. Although CrossOver includes some settings for window management and display resolution, adjusting those settings didn't solve the problem for all programs. (My guess: The programs that didn't look right aren't optimized for high-dpi displays. On my Surface Pro 3, for instance, Steam's window size looks fine, but the text looks fuzzy.)

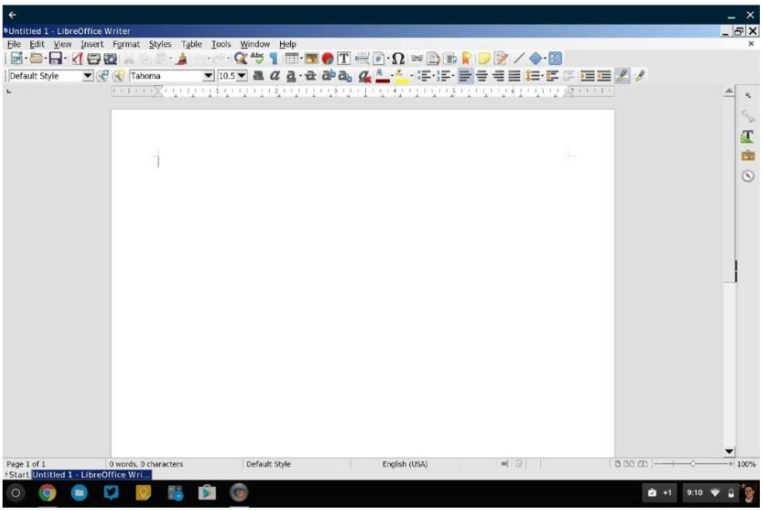
The bigger issue, however, is that many of the programs I tested failed to work at all. Here's a rundown of what I tried, and what happened with each:

• **Steam:** Installed successfully, although a "steamwebhelper.exe" error appears after opening the program. Steam also failed to recognize the desktop PC on my wireless network for in-home streaming, and would not open in Big Picture Mode.



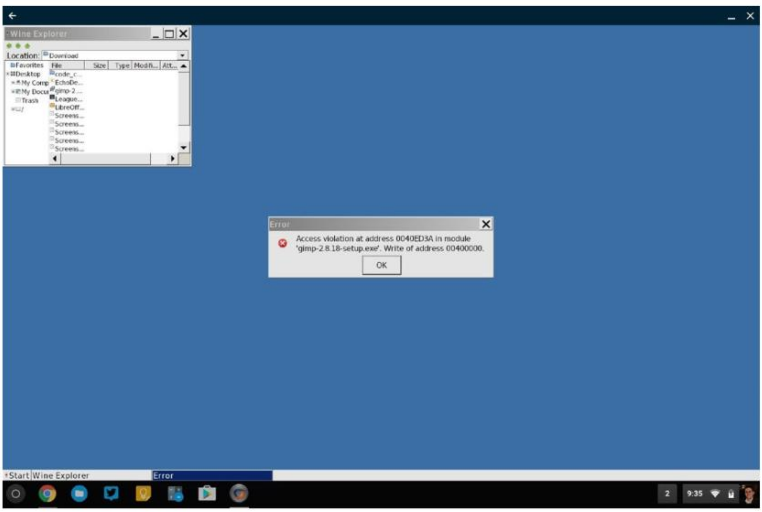
Limbo running on a Chromebook Pixel in CrossOver Preview.

• **Steam games:** I was able to install and play the indie platformer *Limbo*. The other games I tested—*Fez*, *Proteus*, *Gunpoint*, and *Mercenary Kings*—either failed outright or required additional software such as Microsoft's .NET framework, which I could not successfully install.



LibreOffice running on a Chromebook Pixel in CrossOver Preview.

- **WinZip:** Installed successfully, and managed to extract a ZIP file.
- **LibreOffice:** Installed and worked like a charm.



GIMP refusing to install on a Chromebook Pixel in CrossOver Preview

- **GIMP:** Crashed during installation due to an “access violation” error.
- **Paint.NET:** Installation screen disappeared without explanation.
- **Diablo III:** Requires Blizzard’s Battle.net software, which installed

but crashed upon launch.

• **League of Legends:** Install screen showed only a black window that prevented any further progress.

• **LiveScribe:** This note-taking program, which I rely on heavily for interviews, installed successfully, but crashed immediately every time I opened it.

To recap: Out of the eight programs I tried to install, only three of them worked. And if you count individual games within Steam, the success rate is just four out of thirteen.

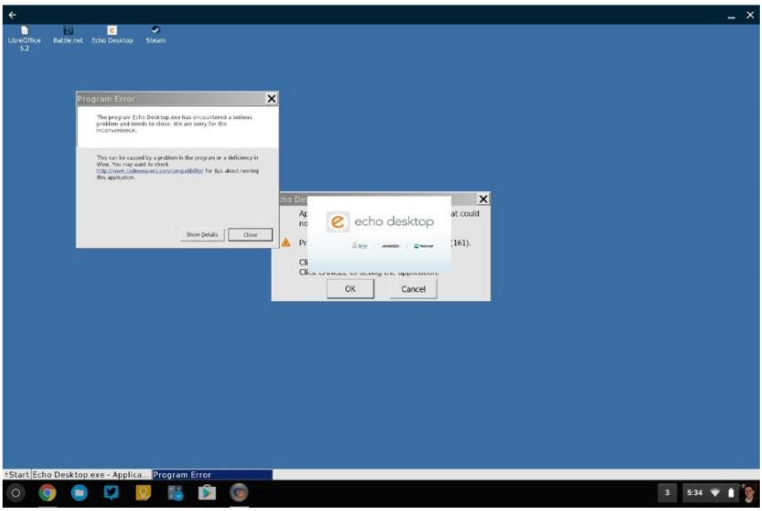
WHY THE WINDOWS LOOPHOLE MATTERS

In fairness, it's early days for CrossOver Android, so we can forgive the fact that many programs don't work. If Codeweavers were charging money for this software—as it does for the Mac and Linux versions of CrossOver—that'd be a different story.

But assuming Codeweavers can whip its Windows emulation into shape, it could be a big boost to folks who are on the fence about Chromebooks. While the Google Play Store already offers plenty of apps for productivity and file extraction (including mobile versions of WinZip and Office), some users still need particular features from the desktop version.

There are also plenty of Windows programs that don't have mobile versions at all. Personally, I can't get all my work done without LiveScribe, whose microphone-equipped pen lets me take interview notes with synced audio. It's the one program that prevents me from taking a Chromebook on work trips, which made its failure to run in CrossOver all the more tragic.

Why not just use a Windows laptop? The best thing about Chrome OS is that it doesn't have any of Windows' overhead and bad habits (like automatic restarts that wipe out all your work). The idea of a leaner operating system could be alluring if you spend the vast majority of your time in a web browser, especially if you can still call on



LiveScribe installed successfully, but crashes at launch every time.

the occasional Windows program when necessary.

The challenge for Codeweavers will be to support not just blockbuster programs like Photoshop and Office, but the kinds of niche applications that keep people bound to the Windows ecosystem. With that extra crutch, Chromebooks could become much more appealing.

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WHY YOU SHOULD TRY LINUX TODAY: 6 compelling reasons

BY BRAD CHACOS

There's never been a better time to give Linux a try.

Wait, don't slam on that back button! I'm not one of those rabid "Year of the Linux desktop" types. Windows works just fine for hundreds of millions of people, and—sorry, Linux lovers—there's little to suggest Linux usage will ever be more than a rounding error compared to Microsoft's behemoth.

That said, there are some pretty compelling reasons you might want to consider switching to Linux on your computer, or at least give it a hassle-free trial run.

1. Windows 10 is taking away your choices

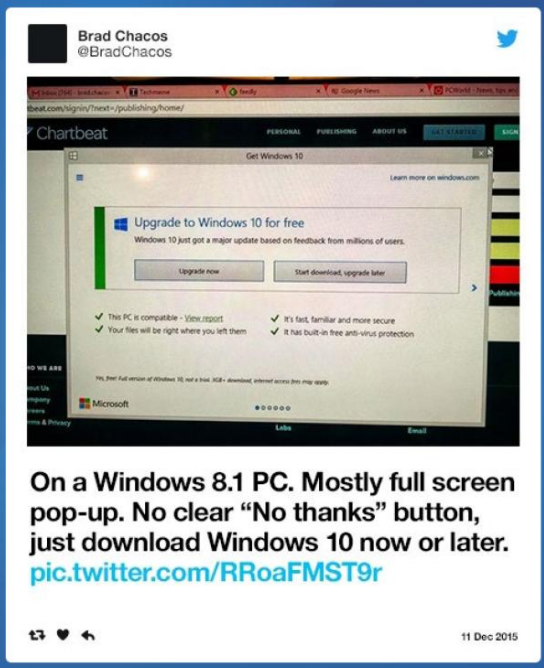
Bear with me. This may seem off-topic, but it's the crux of the issue for a lot of people. Linux's most alluring feature for many won't be anything that Linux actually does, but what it doesn't do. And it's all due to Microsoft's folly.

Windows 10 may be the best Windows ever (go.pcworld.com/

Eventually, Microsoft began pushing Windows 10 out as a Recom-mended upgrade, forcibly installing it on some systems.

win10rev and I use it daily on my primary PC) but Microsoft's pulled some tricks that range from questionable to downright gross in order to drive its adoption numbers higher, and to coax you into using the myriad Microsoft services and paid upgrades (go.pcworld.com/w10notfree) baked into the operating system.

It began with endless pop-ups on Windows 7 and 8.1 PCs—pop-ups that started innocently enough before crossing the line into deceptive malware-like tactics. When that didn't boost adoption numbers high enough, it morphed into nastier tricks and full-on forced upgrades that prompted some fearful owners to disable Windows updates completely rather than be pushed into Microsoft's new operating system.



More recently, the Windows 10 Anniversary Update bundled some severe negatives in with its plentiful positives. The Cortana digital assistant, which pings Bing servers whenever you search your PC, is damned near impossible to disable completely now. And when I upgraded my primary PC to the Windows 10 AU, I discovered that all of the settings related to the many ways Windows 10 pushes ads at you were re-enabled, after I'd explicitly disabled them prior. None of my other system settings appear to have been touched. Yuck.

What's more, Windows 10 changed the way it handles updates to more closely resemble mobile operating systems. You can't pick and choose which patches to install, or even refuse updates on consumer

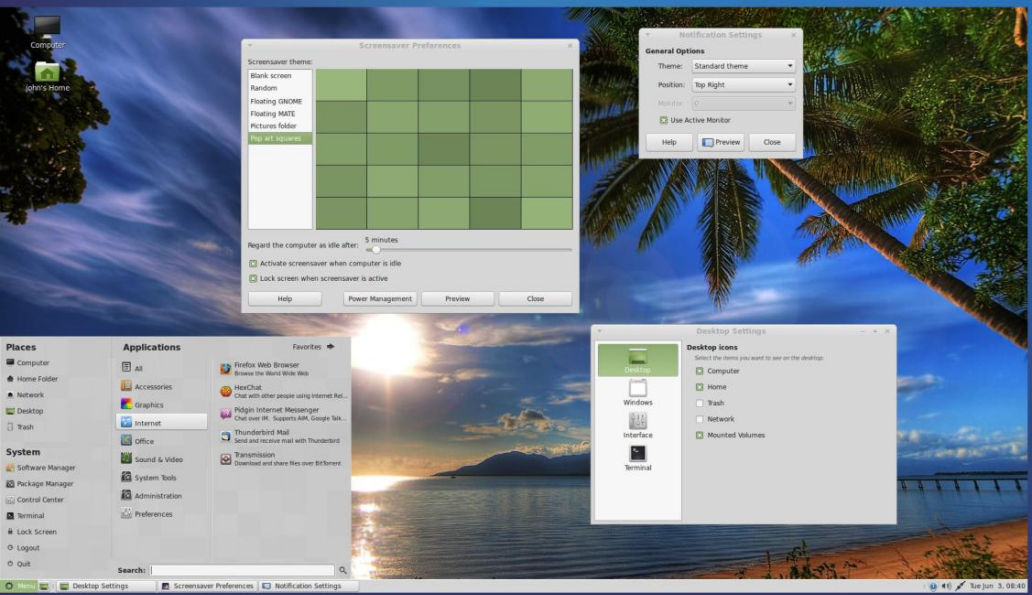
operating systems. If Microsoft pushes a Windows 10 update, you *will* receive it eventually. The company also tweaked the way Windows 7 and 8 handle patching. Now, you can no longer choose which individual updates to install; you have to take the whole kit and caboodle.

By default, Windows 10 beams much more of your data back to Microsoft than previous Windows versions as well. Most of it can be disabled, but most people don't dive that far into system settings.

Lots of people are still plenty happy with Windows 10, don't get me wrong. But these moves are also ruffling the feathers of a lot of users. At the same time…

2. Linux is more polished than ever

Most major Linux distributions never abandoned the basic principles of the desktop. While Microsoft enraged the world with the Windows 8 disaster, popular Linux distros like Fedora (go.pcworld.com/



Linux Mint with the MATE desktop environment.

fedora24) and Linux Mint (go.pcworld.com/linuxmint18) kept their heads down and spit-polished the traditional PC interface.

For people used to Windows XP and Windows 7, some Linux distros may be easier to wrap your head around than Windows 8 and 10—both of which have a learning curve, just like switching to Linux. Linux Mint's Menu bears much more similarity to the traditional Windows Start menu than Windows 10's Live Tile–infused alternative, that's for sure.

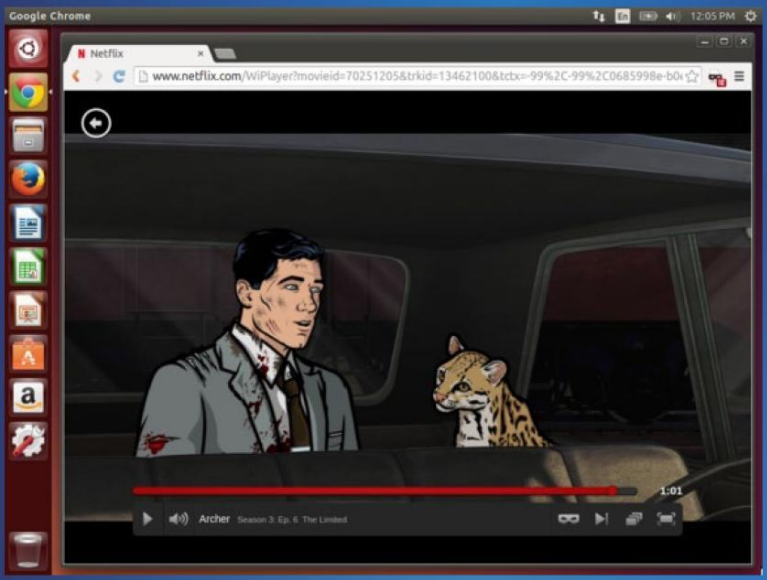
Better yet, Linux's dark days of rampant incompatibility with PC hardware—especially networking and audio components—have largely been eradicated. Most Linux operating systems just plain work with a wide swathe of modern PCs and PC hardware, though you may need to perform a few extra steps to install Linux on a PC with Intel's Secure Boot (go.pcworld.com/linuxsecureboot) enabled. Better yet, you can test Linux distros on your PC before actually installing them, so you'll know whether everything works. We'll get into that a bit later though.

The key point, however, is that Linux is no longer a janky, broken mess useful only to dyed-in-the-wool geeks.

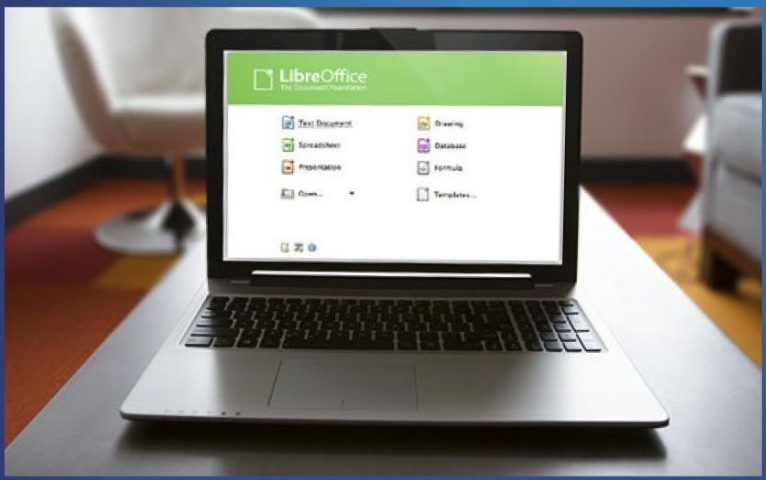
The key point, however, is that Linux is no longer a janky, broken mess useful only to dyed-in-the-wool geeks. There are numerous polished, refined distros that anybody can pick up and use.

3. Open-source software is, too

The quality—or lack thereof—of open-source software was another longtime bugbear for Linux. No more. These days, Linux houses superb alternatives to all of the most-used Windows software, from Office rivals (Libre Office) to Photoshop alternatives (GIMP) to media players (VLC). That trio alone covers the typical software usage of many households, and *PCWorld*'s guide to the best open-source software (go.pcworld.com/freeopensourcesw) for everyday PC users features many



Chrome for Linux playing Netflix on Ubuntu. Oh *Archer*, you're so silly!



LibreOffice.

more. Many top-notch video games even call Linux home now, thanks to the arrival of Valve's Linux-powered Steam Machines.

Playing copy-protected movies and music used to be another major Linux headache. Once again, that's no longer the case. VLC will run virtu-

ally anything you throw at it, while Chrome (and Firefox soon) support streaming videos from the likes of Netflix and Amazon Instant Video.

But standard PC usage for a lot of people revolves around the web—checking Facebook, slinging email, browsing YouTube and Amazon, et cetera. Naturally, those all work just fine on Chrome and Firefox in Linux. The browsers work the exact same way they do on Windows.

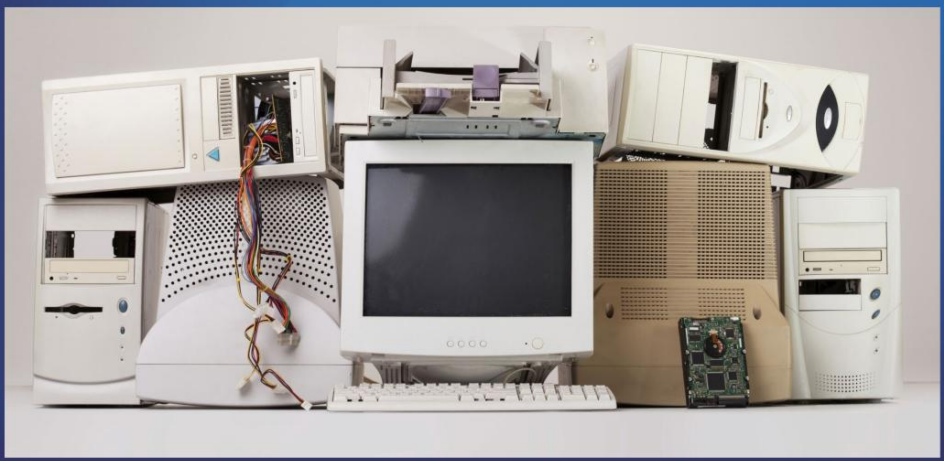
The modern Linux ecosystem can handle everything you throw at it, and handle it well (though hard-core gamers may still want to keep a copy of Windows handy). And did I mention most of the software available for Linux is free, too? Just like…

4. Linux is free

Hey, it is. Not only does that make it relatively risk-free to try, but it also means you won't need to spend $100 on a Windows license if you're building a PC from scratch or upgrading an old computer.

5. Linux runs great on old PCs

Windows XP was tossed to the wolves long ago, and Windows Vista's end is rapidly drawing near. But hundreds of millions of people rely on



PCs that are several years old. Installing Linux can not only plop an up-to-date (and updated) operating system on your PC, it can breathe new life into your computer if you choose a lightweight distro designed for aging PCs, such as Puppy Linux (puppylinux.org) or Lubuntu (lubuntu.net , aka "Lightweight Ubuntu").

The transition doesn't have to be painful, either. There are numerous easy Linux alternatives (go.pcworld.com/linuxalt) designed for Windows XP refugees. These distros offer dedicated Windows XP Modes that mimic the look and feel of Microsoft's most venerable operating system.

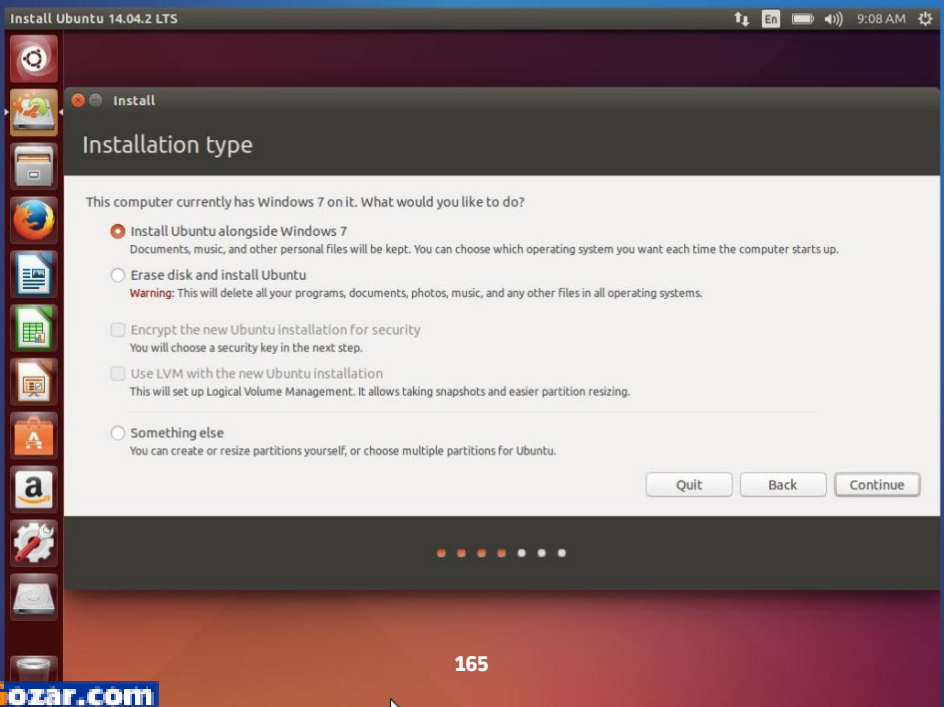
6. Linux is easy to try

Okay, okay, I've sold you. You're ready to test-drive Linux. Fortunately,

Linux is dead simple to try. You don't even have to ditch Windows if you're feeling hesitant.

Before you install a Linux distro on your PC's hard drive, I suggest giving your chosen operating system a whirl with a live drive or live DVD. With live drives, you install a bootable system of a Linux distro to a DVD or flash drive, then configure your PC to boot from that rather than your hard drive. It takes minimal muss and fuss, lets you try several Linux operating systems quickly, and doesn't touch the Windows installation on your primary storage drive.

PCWorld's tutorial on creating a bootable Linux flash drive (go.pcworld.com/linuxusb) can help you set one up. But which Linux operating system should you try? Our guide to the best Linux distros for beginners (go.pcworld.com/linuxdistros) can guide your decision. Personally, I think Linux Mint provides the best experience for experimental Windows users, because it mixes Ubuntu's flexible approach to closed-source software with a Windows-like interface.



Installing Ubuntu Linux alongside Windows.

Using Linux shouldn't be too much of a hassle, especially if you opt for an operating system with a Windows-like Start menu, but there are several core differences. Read our beginner's guide to Linux (go.pcworld.com/linuxbeginguide) to go in with both eyes open, and don't be afraid to ask questions if you run into a problem. Most major Linux distros offer an online forum with dedicated help sections.

If you decide you like Linux, you can use the same live drive (or disc) to install your new operating system on your hard drive. You can keep Windows on your PC if you'd like, too. *PCWorld*'s guide to dual-booting Linux and Windows (go.pcworld.com/linuxwindualboot) explains everything you need to know. And again, if you run into pesky Secure Boot errors while trying to install your Linux OS of choice, refer to our primer on installing Linux on PCs with Secure Boot (go.pcworld.com/linuxsecureboot).

If you're running an older PC with limited hardware or a dead OS, or if you're irked at some of Microsoft's recent decisions around Windows 10, there's no reason not to give Linux a try.

See? That wasn't so hard. If you're running an older PC with limited hardware or a dead OS, or if you're irked at some of Microsoft's recent decisions around Windows 10, there's no reason *not* to give Linux a try. You might just like what you find—especially if you spend most of your digital life in a browser and productivity suite.

HERE'S HOW

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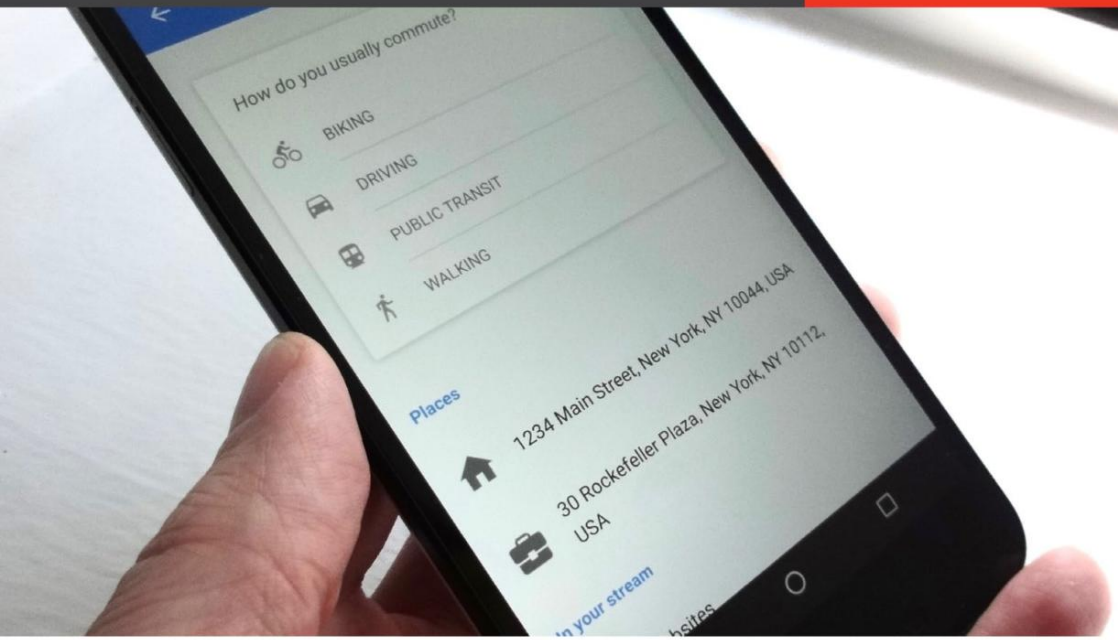


6 settings to make your Android phone anticipate your needs

Don't do for yourself what Android can do for you.

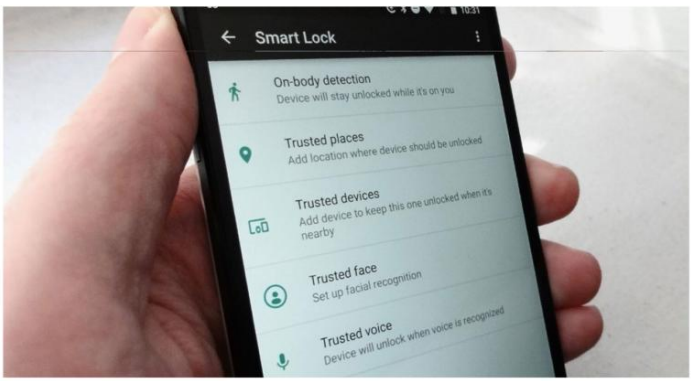
BY BEN PATTERSON

THERE'S NO DENYING that our smartphones have made our lives so much easier, putting our contacts and schedules, our driving directions, *the whole internet*, right at our fingertips. But if you're using an Android phone you might be leaving even more convenience on the table.

There are a bunch of super-smart settings in Nougat and Google Now that'll make your Android device feel like it's 10 steps ahead of you.

Your Android phone can be proactively telling you how long it'll take to get to work in the morning, and nudging you when your favorite team is about to take the field. Your device can keep itself unlocked whenever it's on you, and those snapshots you just took can automatically be arranged into beautiful collages. Battery running low? Android can know to dial down background activity to keep your phone alive. And if you love the idea of asking Google questions without ever touching your phone, you can train your phone to do that, too.

1. Turn on Smart Lock

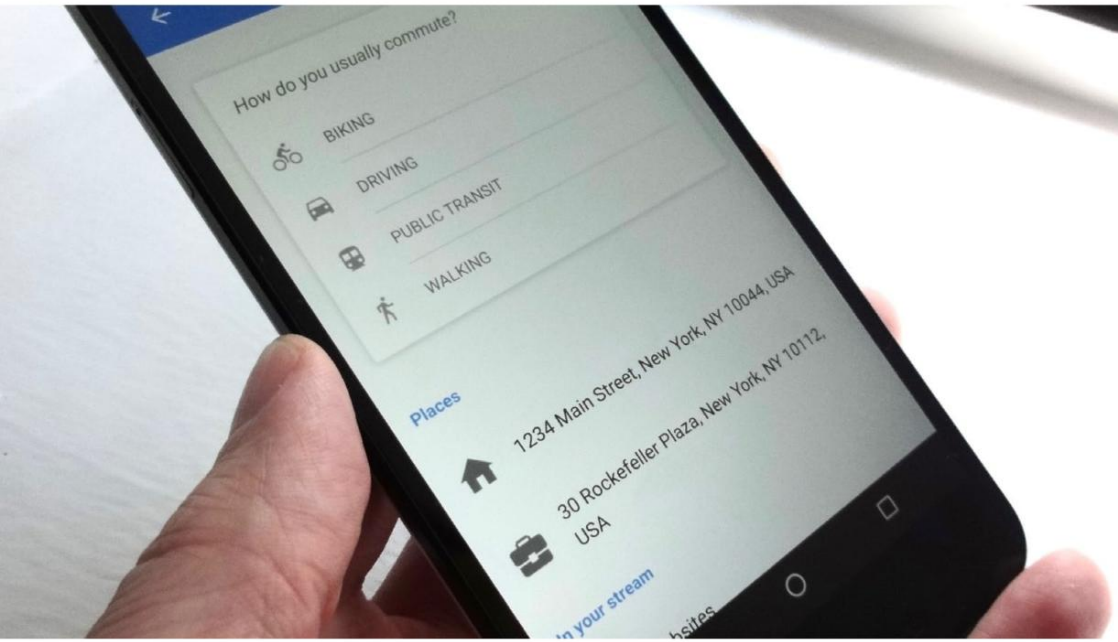


Android's clever Smart Lock feature can keep your phone unlocked while you're at home, or whevever you've got your handset on you.

One of the smartest recent Android features is aimed at one of the most vexing smartphone annoyances: having to unlock your handset each time you use it. Isn't there an easier way to let your locked phone know that you're, well, you?

That's the idea behind Smart Lock. Once activated (just tap *Settings > Security > Smart Lock* to get started), you can set Smart Lock to unlock your phone whenever you're at home, when it scans your face with its camera, when it hears your voice, or whenever it's near your Bluetooth watch or a Bluetooth car stereo. There's even a setting that'll keep your phone unlocked as long as you're holding it or while it's sitting in your pocket.

So, is Smart Lock smart enough to know that your Smart Locked device just got snatched out of your hands by a robber, and that it should lock your phone immediately? Well, no, which is why anyone who's paranoid about security should probably stick with a passcode or touch ID. Still, for those of us sick of punching in PINs while sitting on our living room sofas, Smart Lock makes for a pretty intelligent setting.



2. Tell Google Now where you live, work, and more

Google Assistant might be getting all the buzz right now, but the older Google Now is no slouch when it comes to doing your bidding and anticipating your needs. You can help Google Now do an even better job of serving up smart suggestions by giving it a few hints about your favorite places, websites, teams, TV shows, and more.

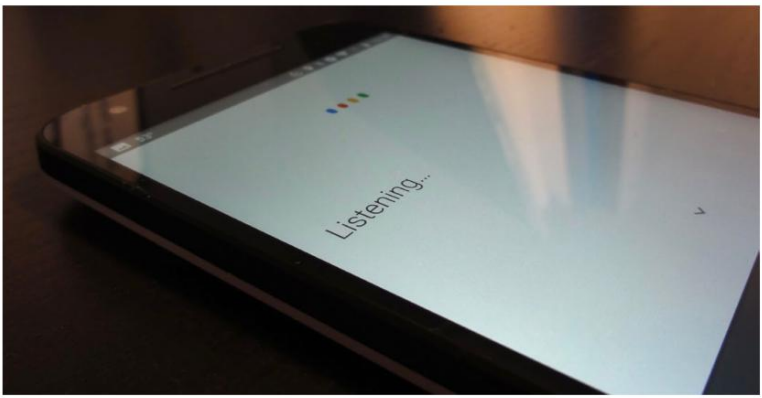
Open the Google Now app, tap the menu button in the top-left corner of the screen, tap Customize, then start filling in your preferences, starting with your favorite way to commute: by bike, car, public transit, or walking.

Next, make sure to let Google Now know where you live and work; once you do, it'll let you know how long your commute will be before you even ask.

You'll also see a series of categories that'll let you give Google Now

Once you tell it where you live, Google Now will give you details on your commute before you even ask

more clues about your tastes and preferences, ranging from your favorite websites and sports teams (perfect for getting alerts whenever your favorite team is about to play) to stock tickers, favorite streaming services, and more.



With the right setting enabled, you can ask Google Now a question without having to touch your phone.

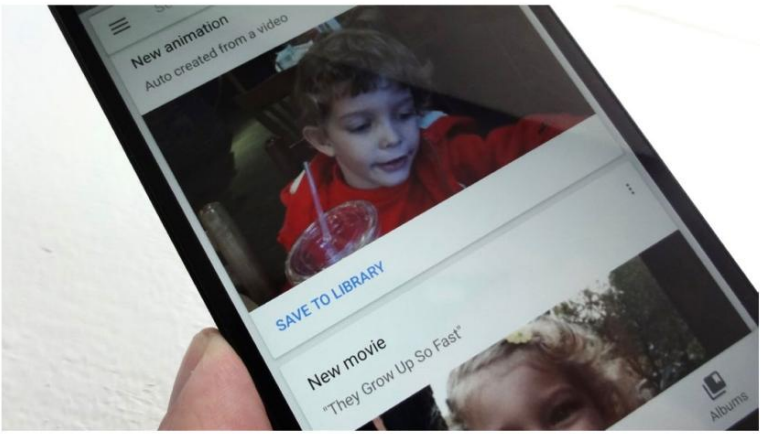
3. Say 'OK Google' without unlocking your phone

Speaking of Google Now, wouldn't it be nice if the original Android assistant would snap to attention whenever you called its name? Well, there's a clever Android setting that'll let you ask Google Now a question whenever your phone is in earshot, no tapping required.

Here's the trick: tap *Settings* > *Google & Now* > *Voice* > *"Google Now" detection*, then toggle on the *Always On* setting. You'll be prompted to train your Android phone to recognize your voice, a process that involves saying "OK Google" three times.

Once your handset is trained and the Always On setting is enabled, you can say something like, "OK Google, how long will it take to get to get to the Empire State Building?" whenever you want, even if your phone is locked and sitting across the room. It's a lot like using the new Google Home device, just without the Home.

Bonus tip: You can also enable the Trusted Voice setting to let Google Now unlock your phone when it hears your voice, meaning



The Google Photos app will create collages, albums, and even videos based on your latest snapshots.

you'll be able to set alarms, send email, and more without having to manually unlock your handset.

4. Let Google Photos create albums and more

No Google Assistant on your phone? No problem, particularly when it comes to photos. The Google Photos app comes with an intelligent assistant that will proactively take your latest snapshots and create new photo collages, albums, and even videos, all without you having to lift a finger.

Tap the menu button in the top-left corner of the Google Photos interface, tap *Settings* > *Assistant cards*, then toggle on the New Creations settings.

Once that's done, Google Photos will begin creating and suggesting new collages and albums based on your most recent pictures, and it'll even cut together movies—complete with background music—using your latest clips. If you don't care for what Photos comes up with, you can always just swipe the creations away.

5. Set Android to preserve your battery life

One of the smartest settings Google ever came up with for Android phones is Battery Saver mode, which lets you put your handset in a low-power state whenever your battery is running low.

Even smarter, though, is Battery Saver's ability to turn itself on without any prompting from you, beyond the initial (and very easy) setup process.

Tap *Settings* > *Battery* > *Battery Saver* > *Turn on automatically*, then pick a setting: either at 5 percent battery left or 15 percent.

6. Silence your device automatically during meetings and other quiet times

Android's Do Not Disturb feature has the smarts to keep it down during calendar events.

You probably know that you can set Android's Do Not Disturb mode to muzzle your phone while you're asleep, and you can always turn it on manually for some impromptu peace and quiet.

Dig a little deeper, though, and you'll find a smart setting that'll automatically silence your phone during meetings on your calendar, or during any other quiet time you designate.

Tap *Settings* > *Sound* > *Do Not Disturb* > *Automatic Rules*, then tap *Add Rule*. To keep your phone quiet during meetings, tap Event Rule, then customize your settings. You can, for example, set your new rule to silence your phone during meetings on a specific calendar, and only during meetings you've actually accepted.

If you always want your phone to silence notifications at lunchtime, set up a new Time Rule, then pick the days of the week, times, and the type of Do Not Disturb mode you want—"priority" mode (which allows certain callers and alerts through, depending on your priority mode settings), alarms only, or total silence.

5 terminal commands every Linux newbie should know

BY ALEX CAMPBELL

I'M A BIG fan of the anime series *Neon Genesis Evangelion*. One of the quotes from it that stands out in my head is, "Man fears the darkness, and so he scrapes away at the edges of it with fire." For newcomers to the world of Linux, the black screen of the terminal can seem like a deep, foreboding darkness, which is desperately replaced by a GUI whenever possible. It doesn't have to be that way.

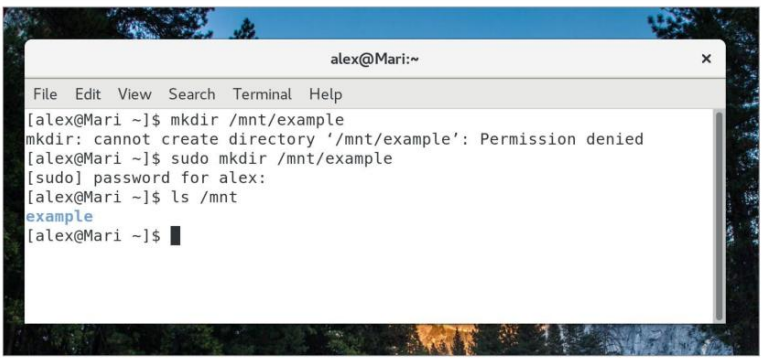
A graphical user interface makes modern computing more enjoyable and easier to use the majority of the time. After all, placing an Amazon order using a text-mode browser in a terminal sounds like

an over-enthusiastic exercise in masochism. We like our GUIs and graphical browsers, but there are times when you'll find yourself in the world of the command line. Like any new tool, knowing a few basics can keep your blood pressure in check when a GUI fails to start, or you need to perform maintenance.

For starters, here are five commands you should become comfortable with as a Linux user.

1. sudo

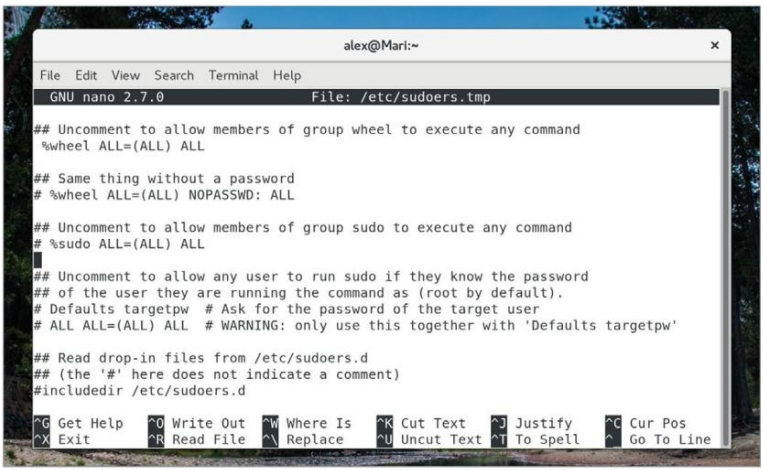
If there is one command that should be treated with equal parts certainty and respect, it's **sudo**. Sudo's effect is quite simple: It runs any command that follows it with superuser (or root) privileges. Running commands with sudo is necessary when doing things like updating the system or changing configuration files.



Since /mnt is owned by root, you have to use **sudo** to create a directory in /mnt.

Sudo also gives the user the power to destroy a system or violate the privacy of other users. This is why you'll see the following lecture the first time you use sudo on a system:

> **We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:**
>
> 1) Respect the privacy of others.
> 2) Think before you type.
> 3) With great power comes great responsibility.



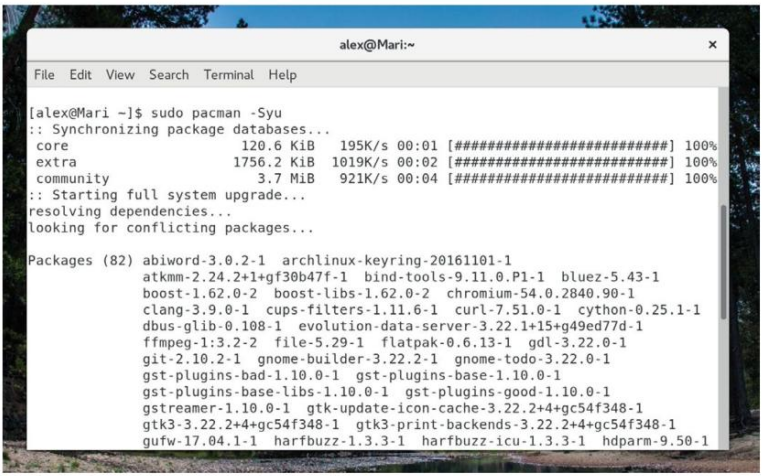
A look at a typical sudoers file, where the groups that allow root access are specified. It is very unwise to allow sudo access to a user or group without requiring a password.

If you're looking to edit or change any file that's outside of your user's home directory, there's a good chance you'll have to use sudo to do it. To be able to use sudo, your user needs to be in the sudoers file or part of a superuser group (usually "wheel" or "sudo"). Ubuntu offers a great guide on the sudoers file (go.pcworld.com/sudoers).

Since sudo carries so much power, it goes without saying that you should not type it before a command if you don't know what the command does. There's an old prank online that instructs newbies to type **`sudo rm -R /`**. (Don't do this.) The command recursively deletes every file on your system, and your OS will happily do it without further prompting. As the lecture file says, when using sudo, "think before you type."

2. Your package manager tools (yum, apt, or pacman)

The number one reason you'll be using sudo is to add or remove programs from your PC via your package manager. Although the three major package managers I mention here all differ in their respective command arguments and grammar, they are all capable of the same three basic functions: installing a package, removing a package, and upgrading all the packages on the system. (Note: Unless you're logged



A system upgrade using pacman on Arch Linux. Note the use of sudo before the pacman command.

in as root, you will need to prepend these commands with **sudo**.)

yum (Red Hat/Fedora/CentOS)

Install a package: **`yum install <package>`**

Remove a package: **`yum remove <package>`**

Upgrade the system: **`yum update`**

apt (Debian/Ubuntu/Mint)

Install a package: **`apt install <package>`**

Remove a package: **`apt remove <package>`**

Upgrade system: **`apt update`** or **`apt upgrade`**

pacman (Arch/Manjaro)

Install a package: **`pacman -S <package>`**

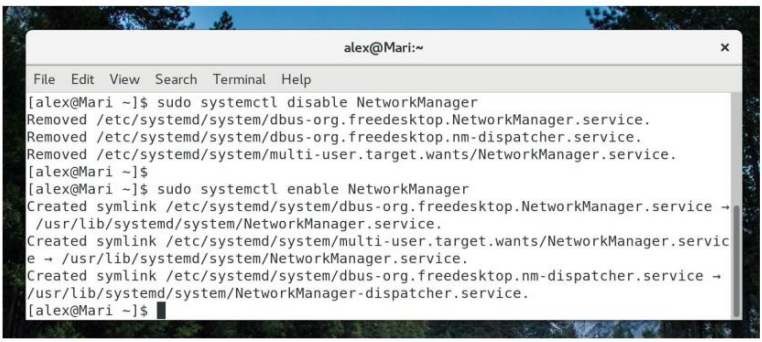
Remove a package: **`pacman -R <package>`**

Upgrade the system: **`pacman -Syu`**

All of these package managers have many more features than what I've listed here, but these three functions are what you'll use most of the time. Whatever Linux distribution you choose, you should be comfortable with the package manager, and know where to find its documentation.

3. systemctl (Systemd)

For the longest time, background programs called daemons were started using a series of scripts called initscripts. For newcomers, initscripts were hard to read and interpret or change. More recently, initscripts have been replaced by a service management application called Systemd. If you're running a recent Linux distribution, there's a good chance that Systemd is starting the services you need.



Disabling and re-enabling the NetworkManager service to run at boot time.

One of the chief complaints about Systemd is that it can do too much. (Unix programs usually aim to do one thing, and one thing very well.) However, there are five keywords you should consider with systemd.

To start a service, simply use the start keyword:

```
systemctl start <service name>
```

Similarly, you can restart a service if it has failed, or if its configuration has changed:

```
systemctl restart <service name>
```

To stop a service, use stop:

systemctl stop <service name>

To enable the service at boot, you can use the enable keyword:

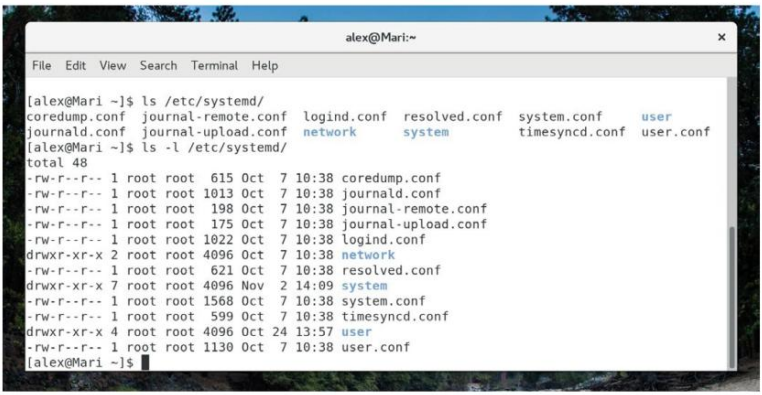
systemctl enable <service name>

And finally, you can disable a service to keep it from starting at boot:

systemctl disable <service name>

4. ls

The **ls** command is simple and straightforward, but it is more useful than one might think. The ls command lists the files and folders in a given path. By default, it lists the files and folders in the current working directory (usually the user's home). You can find the contents of a given path too.

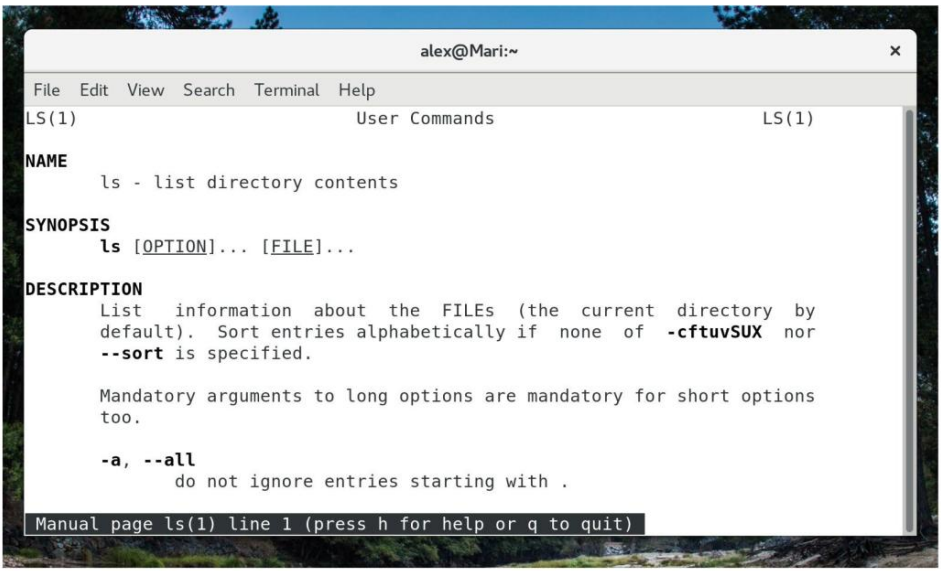


There are several options to ls, but the most common to use is -l, which shows file permissions and ownership.

So what makes this Linuxy-version of the Windows **dir** so useful? Well, for one you can look in subdirectories for configuration files. It's also helpful for looking for file names in an environment without a GUI. Since Linux filenames and commands are case-sensitive, it's handy to know exactly how something is spelled. In short, think of ls as your scout that you can use to peek around the system.

5. man

Sometimes you need help. Sometimes you need help and you don't have access to the internet. Those are dark times. In those situations, **man** can save your butt.



The manual page for ls.

The command man is short for manual, and provides "online" (stored on your computer) access to command documentation. If you need reminding about what **chmod** does, you can simply type in **man chmod** into your terminal to read about the command. You can scroll up and down in the man page by using the arrow keys or PgUp and PgDn keys. When you're done reading, hit Q to quit.

Though man can be useful when an internet connection isn't available, Google is a much better resources when you actually are online. It's worth noting that the first few Google results you'll get for a given command like chmod will be a web version of the man page.

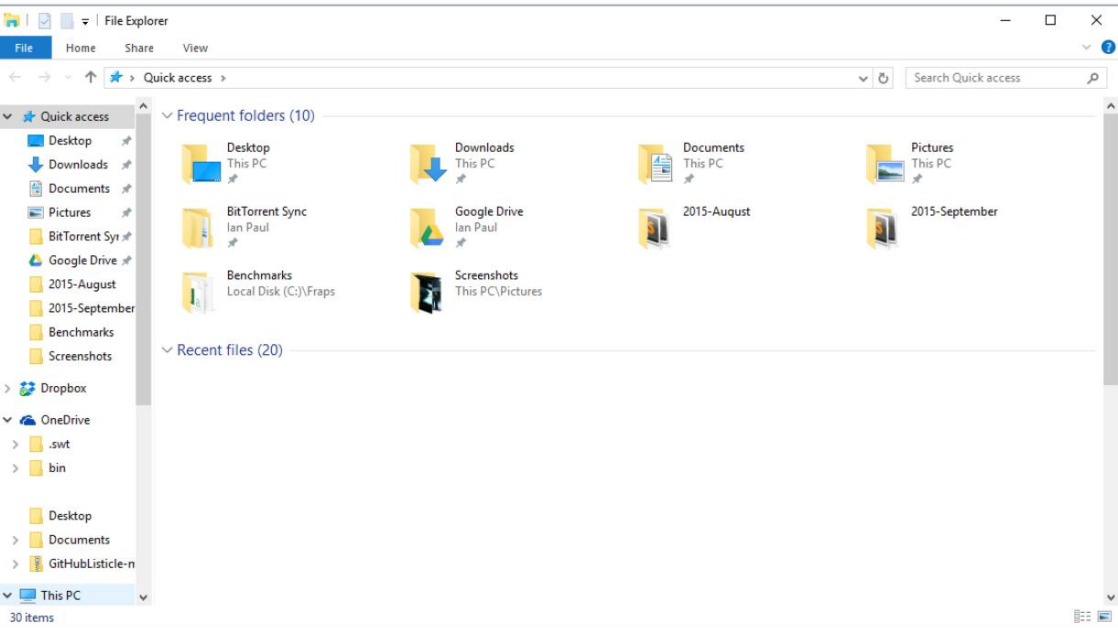
Wrapping up

There are many, many more commands to learn, but dipping your toes into the world of text-mode commands can help you understand your system better and make it a bit less scary. While there are lots of ways to accomplish things in a graphical desktop, console commands are still the fastest way to update your system.

Console commands also have the added benefit of showing errors when things go wrong. That means when an update fails, you can generally tell if something was wrong with the package, or if you simply didn't have an internet connection.

With a bit of practice, anyone can start banging out terminal commands with confidence and the skillful use of sudo.

For more information on Linux commands, there is a great cheat sheet (go.pcworld.com/pixelbeatcmdline) at Pixelbeat.org.



3 handy image tools you can use in File Explorer

BY IAN PAUL

BELIEVE IT OR not, File Explorer has a few handy image tools that can make your life easier. They're nothing exciting—we're not talking about hidden image-editing here. Nevertheless, these tools are helpful to know about in a pinch.

All three of these tools exist under the *Manage* tab when you open a folder in File Explorer that contains images. The *Manage* tab will not appear if you're looking at a folder with just documents or other file types.

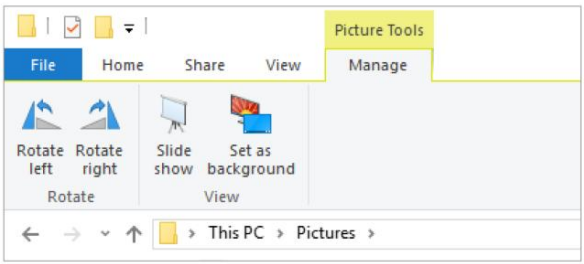
These features are available on Windows 8 and up.

Start a slideshow

The first feature is the ability to quickly start a slideshow. Open your folder of choice containing photos. Then click the *Manage* tab and select *Slideshow* from the various options. A slideshow will start that includes all the photos contained in the folder. Check out our earlier look at this feature for ways you can speed up and slow down the slideshow (go.pcworld.com/slideshowspeedslow).

Set as background

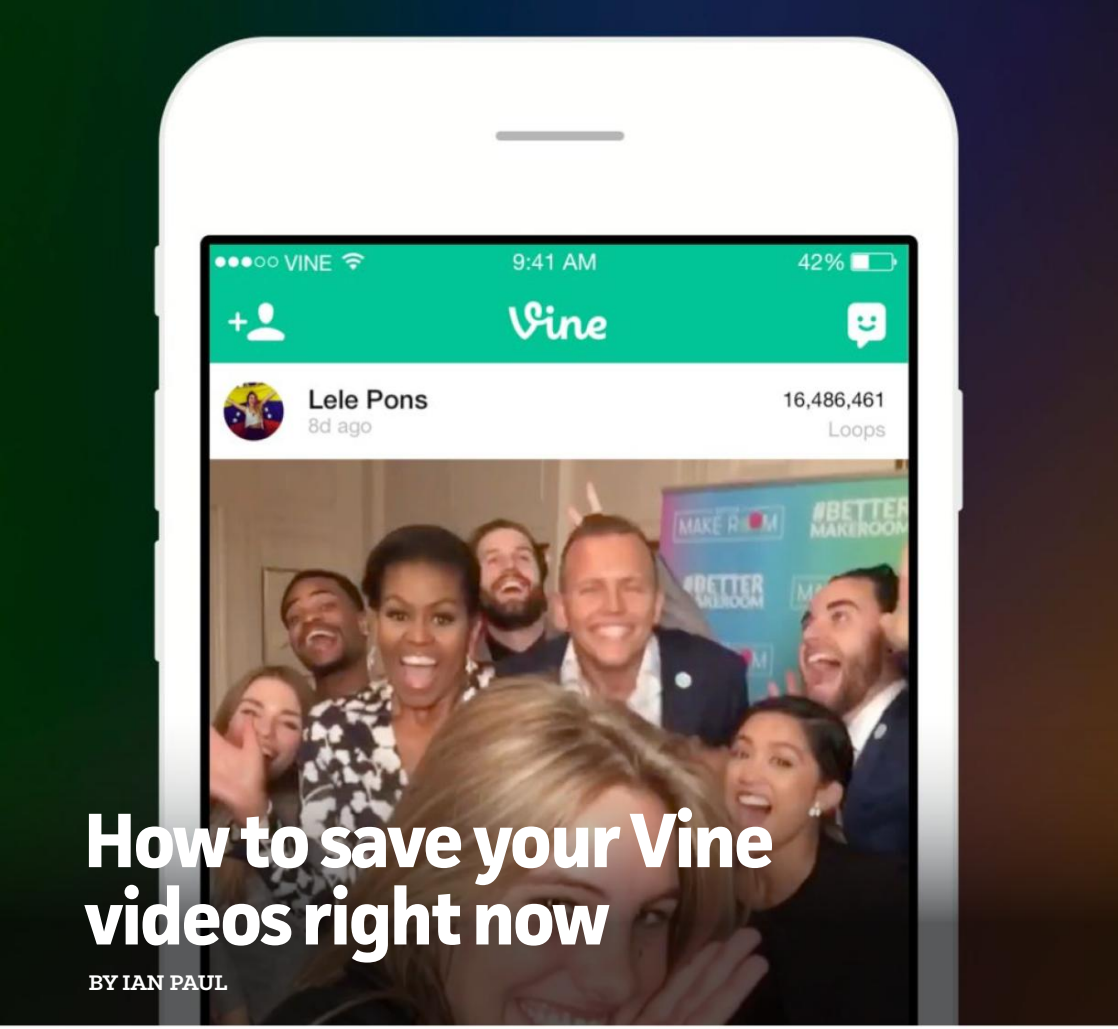
There are several ways you can set an image as your desktop background, here's one more. Again under the *Manage* tab, select the image you want to set as your wallpaper, and then click the *Set as background* option. This will set that image as your background across all monitors. Check out our earlier tutorial if you want to have a different wallpaper (go.pcworld.com/w10wallpaper) on separate monitors.



File Explorer's Manage tab for photos.

Rotate images

One last feature under *Manage* is the ability to rotate photos. There are two options: *Rotate left* and *Rotate right*. Select the file you want to rotate, and then select the desired option. Rotating often comes in handy with photos imported from a smartphone or camera that have an incorrect orientation.



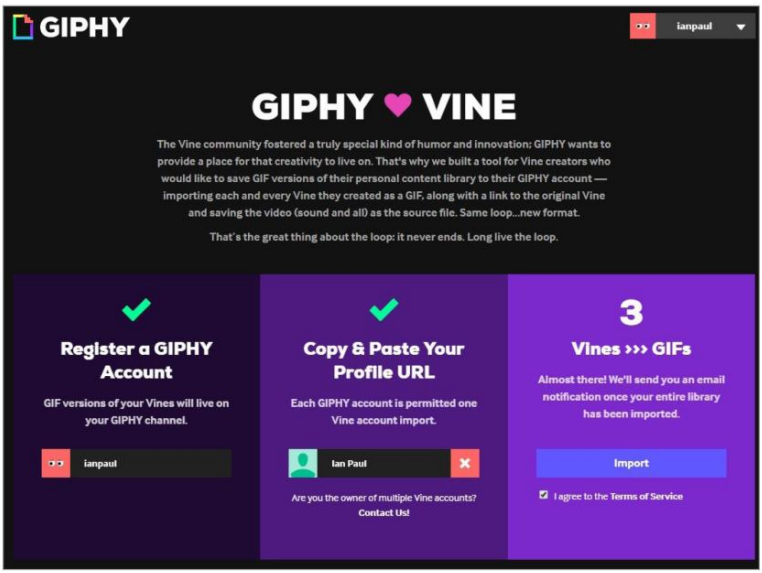
How to save your Vine videos right now

BY IAN PAUL

SHORT-FORM VIDEO CREATORS everywhere were dumbstruck at the end of October when Twitter announced it was killing Vine. There's still no word on when Vine might see its final day, and there are rumors that Twitter may sell Vine to a third-party, giving the service new life.

But the fact is Vine's fate is still uncertain, and anyone who can't get enough of their seven second videos should back up their memories. It's likely Twitter will provide a way for users to export and save their videos should the end truly come.

For now, here are two ways to save your Vine videos to a PC, as long as your Vine account isn't private.



Giphy

The most publicized tool for grabbing your Vines is a new site created by Giphy. It will take your short videos and turn them into animated GIFs hosted publicly on Giphy. The source files for all videos will remain intact including sound.

Log in to the Giphy loves Vine website (giphy.com/giphylovesvine) and create a new Giphy account if you don't have one. Next, drop in your the URL for your Vine user name.

If you don't know what your username is, log in to your Vine account on Vine.co. In the upper right-hand corner hover over your profile picture and select *View Profile*. On the next page, copy the web address, drop it into Giphy, and click *Import*. Giphy will notify you via email when the import is complete. Once your Vines are imported you can download them one-by-one.

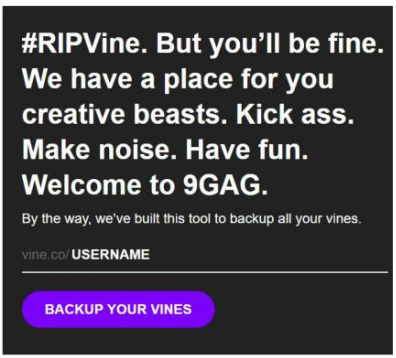
To download the original source file with sound, click on your GIF of choice to go to its dedicated page on Giphy. Next, click the *Advanced* tab below the image and look for the "Source Download" entry and

click the *Download* button next to it.

Giphy only allows one Vine import per Giphy account, though you can contact them directly if you have multiple accounts.

The downside of Giphy is that it only saves Vine videos that were created by you. Any "Revines" (Vine videos of others that you re-posted to your account) will not be saved. If you want to save those too, you'll need this next tool.

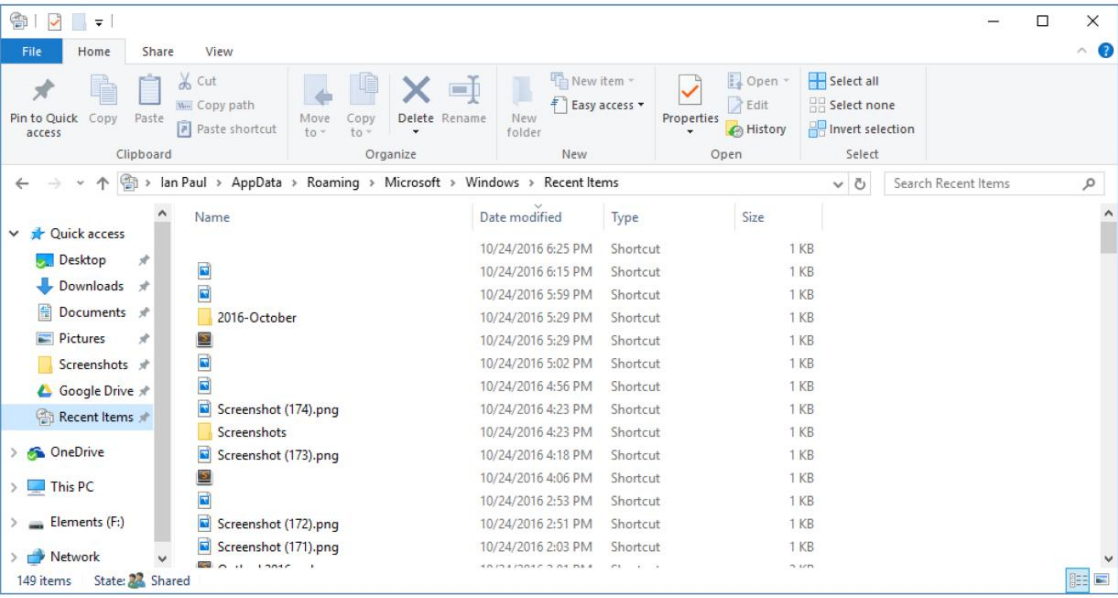
RIP Vine



Another option is to use RIPVine.co from 9GAG, a social media site that hosts animated GIFs and other images. RIP Vine grabs everything from your Vine account including anything you've re-shared that wasn't created by you.

The process is a little bit simpler than Giphy. First, you don't need an account with RIP Vine, but you will need your Vine account address once again. This time, however, you only need to enter everything after the "u" in the address. For my account that would be "u/960257503373955072," for example. Once you've copied that part of your Vine profile address paste it into RIP Vine after **`vine.co/`**.

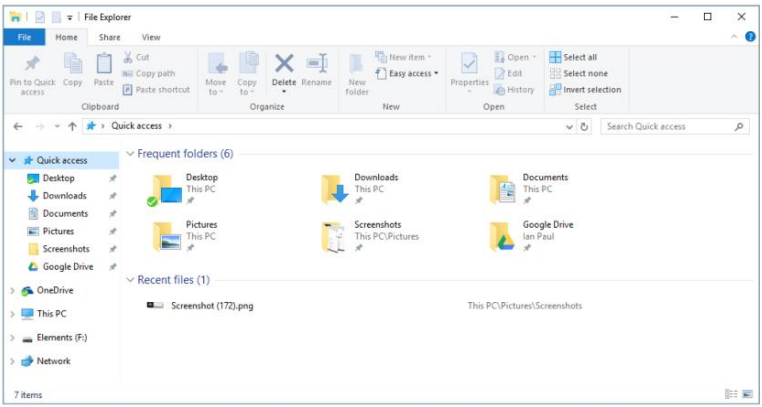
Now click *Backup your Vines* and the process will begin. Don't close the tab, and once it's done your Vines will be available on RIPVine.co. Again, they'll be public. Now just hit the big *Download* button below each video to grab it.



How to pin the Recent Items folder to File Explorer in Windows 10

MICROSOFT OUTLOOK 2016 has this really handy feature for adding attachments. When you click *Attach File* it lists the most recent documents you worked on regardless of which program you used. It can be a screenshot you recently took, a basic text file you opened in Sublime Text, or a spreadsheet in Excel.

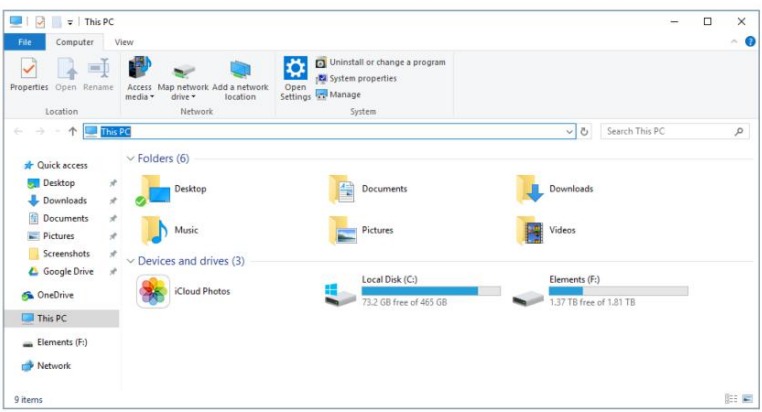
It's a handy feature that would be nice to use in other programs or web apps that don't offer similar functionality. By default, File Explorer in Windows 10 has a recent-files section when you open to the *Quick*



The default recent items section in File Explorer.

Access section. That's nice, but personally I'd prefer to look at a recently-used-files section that has its own full window.

It's actually very easy to achieve. Open File Explorer and then click on the address bar until the text there is highlighted in blue. Now you can



File Explorer's address bar is now ready to edit.

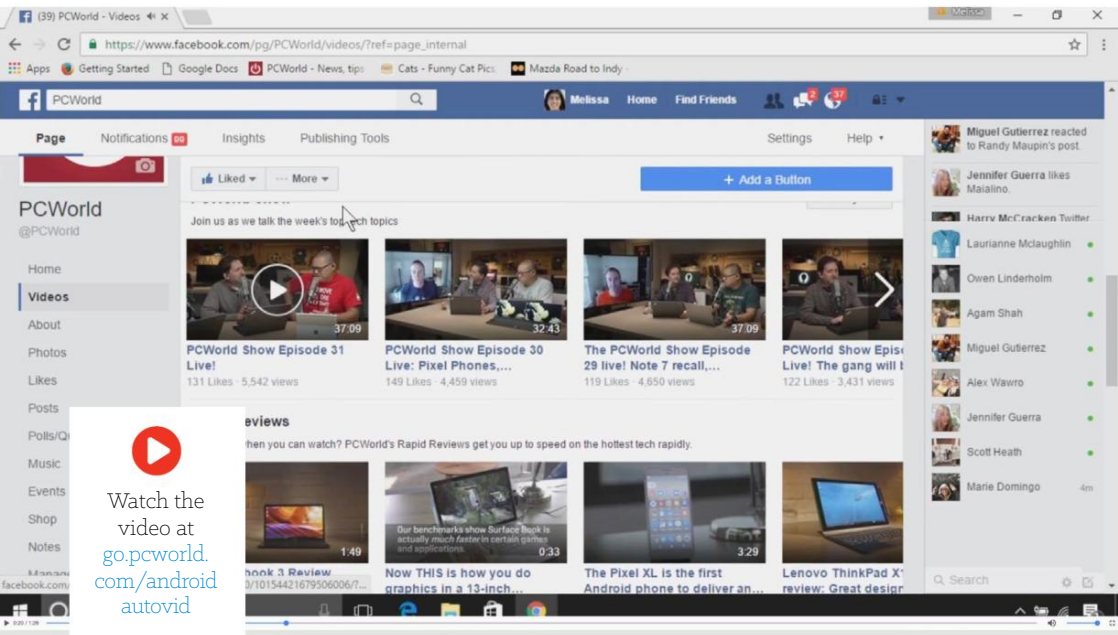
edit the bar to anything you like.

Paste the following into File Explorer: **`%AppData%\Microsoft\Windows\Recent`**, and hit *Enter.* This will take you directly to your "Recent Items" folder. Now, all you have to do is click the *Pin to Quick Access* tile under the *Home* tab in File Explorer.

A new folder option will show up under the Quick Access section of File Explorer called "Recent Items" complete with its own icon. Before you start using this section, however, you want it to organize all files by date modified. The default is to list files and folders by name, which isn't much help when you want to see the most recent items you worked on. To make the switch click on the *Date modified* column, and your items will be re-organized by date with your most recent files and folders at the top.

You're all set. The next time you need to add something to Gmail that you recently opened just turn to the Recent Items bookmark in File Explorer.

The one downside to this approach is that it holds shortcuts (placeholder links) to the actual files. That means Recent Items won't work with drag-and-drop features such as in Gmail, but selecting the file via an attachments icon and clicking *Open* will work just fine.



Watch the video at go.pcworld.com/androidautovid

The easy way to save Facebook videos

MIKE WANTS TO save a video from Facebook. Luckily if you're using a desktop or laptop PC it's quite easy.

I can almost hear you saying, "Hold on Josh—when I watch a Facebook video on my PC there aren't any links to save it!" Correct, but all you have to do is trick your browser into thinking you're browsing Facebook on your phone. Here are the steps:

Right-click any non-Youtube video and select

Right-click the video and select Show video URL.

Show video URL

Copy this URL to your clipboard, then paste it into the browser's address bar.

Hit *Enter* to open this page

Delete the 'www' in front of the URL and replace it with the letter 'm' so the links look like this:

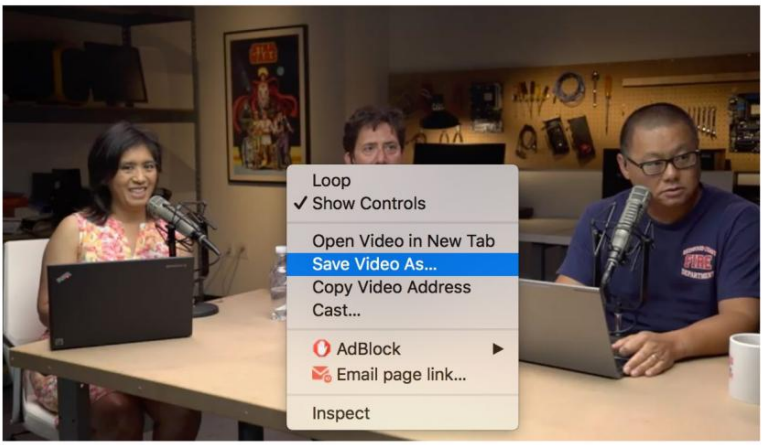
We just need to remove these w's.

Replace the w's with an m to view the mobile version.

Hit *Enter* to open the mobile version of the video and click *Play* on the video. It has to start playing for you to proceed to the final step.

Right-click the video and select *Save Video As...*

Save the video to your PC, and now you can watch it using your video player of choice for MP4 files.



And voila - you can now save the video.

Tech Spotlight

A video showcase of the latest trends

Uncovering the secrets **of the USS Arizona in Pearl Harbor**

» Compact robot explorers are giving researchers firsthand looks into renowned shipwrecks such as the U.S.S. Arizona, which sank in Pearl Harbor when the Japanese attacked on December 7, 1941. The agile robots navigate using two thrusters and a rotating outer body. A clear center section provides 360-degree views.