

LINUX LAPTOP

2018 Buyer's Guide



LINUX
JOURNAL

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The Chromebook Grows Up

By Philip Raymond

Android apps meet the desktop in the Chromebook.

What started out as a project to provide a cheap, functional, secure and fast laptop experience has become so much more. Chromebooks in general have suffered from a lack of street-cred acceptance. Yes, they did a great job of doing the everyday basics—web browsing and...well, that was about it. Today, with the integration of Android apps, all new and recently built Chrome OS devices do much more offline—nearly as much as a conventional laptop or desktop, be it video editing, photo editing or a way to switch to a Linux desktop for developers or those who just like to do that sort of thing.

Before I go further, let me briefly describe the Linux road I've traveled, driven by my curiosity to learn and see for

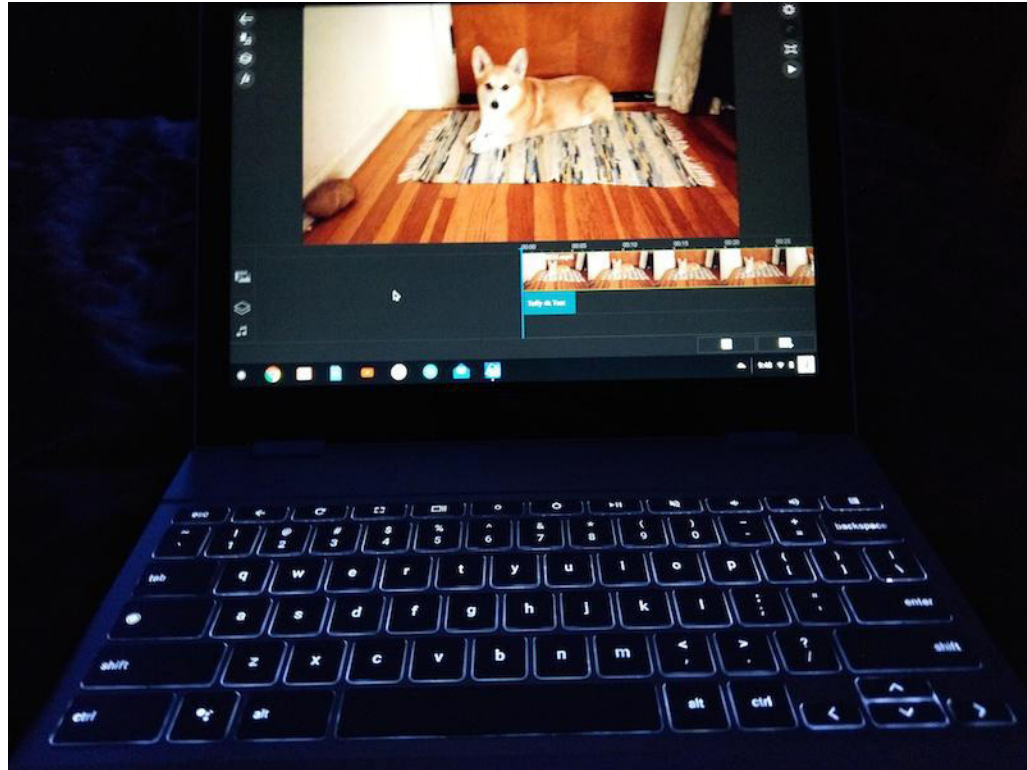


Figure 1. Pixelbook in the Dark

myself how much could be done in an Open Source world. I've used Linux and have been a Linux enthusiast ever since I first loaded SUSE in 2003. About three years later, I switched to Ubuntu, then Xubuntu, then Lubuntu, then back to Ubuntu (I actually liked Unity, even though I was fine with GNOME too). I have dual-booted Linux on several Gateway desktops and Dell laptops, with Windows on

the other partition. I also have owned a Zareason laptop and most recently, a System 76 laptop—both exclusively Ubuntu, and both very sound, well-built laptops.

Then, since I was due for a new laptop, I decided to try a Chromebook, now that Android apps would greatly increase the chances of having a good experience, and I was right. Chrome OS is wicked fast, and it's never crashed in my first six months of using it. I mention this only to provide some background as to why I think Chrome OS is, in my opinion, the Linux desktop for the masses that's been predicted for as long as I've used Linux. Granted, it has a huge corporate behemoth in the form of Google behind it, but that's also why it has advanced in public acceptance as far as it has. This article's main purpose is to report on how far it has come along and what to expect in the future—it's a bright one!

Chromebooks now have access to Microsoft Office tools, which is a must for those whose employers run only MS Office products. Although Google Docs does a good job with basic document creation and conversion, and although you can create a slide presentation with it, it won't do things like watch or create a PowerPoint presentation. That's where the Microsoft PowerPoint Android app comes in handy. If you need to watch one, simply download the PowerPoint file and open it with PowerPoint (you

can do this without paying for Microsoft office). However, if you want to create or edit one, you'll have to pay for a yearly subscription or use your company's subscription.

It's also now possible to do 4k Ultra HD video editing, albeit consumer-grade video editing, not professional (think I-Movie), which addressed a reason for my own avoidance of a Chromebook in the past.

Although Android apps don't work on some older Chromebooks, there is a way to see if your older Chromebook is compatible. Go to your login picture in the lower-right corner and click on it, then go to the settings wheel in the window. In settings, if you see an option to enable the Google Play Store, your older Chromebook can run Android apps if you enable it. If you don't see this option, it can't.

What does Chrome OS still not do? High-end photo editing (aka a full Adobe Photoshop app). There is the Adobe Lightroom Android app, which is different photo-editing software that does many of the same things Photoshop does for most people. The only functions it can't do well are major retouching and graphics editing other than photos. One thing it does better than Photoshop, however, is not writing over raw images. That's the only shortcoming I can find in today's Chromebook.

Some might consider the lack of high-end gaming to be a shortcoming as well, but that's about to be addressed in the form of some very serious games coded for Android mobile that actually could be a better experience on a Chromebook (or a Chromebox for a desktop gaming experience). At the time of this writing, Epic's Fortnite Battle Royale is coming soon to Android, marking the beginning of what finally could bring great, well known games to Chromebooks. PUBG also is developing games for Android. Of course, keyboard and mouse/touchpad support is vital to make this truly work, and I do believe it will arrive sooner rather than later, perhaps during this year.

Some Favorite Android Apps on the Chromebook

Power Director is the first Android video-editing app I've ever used that did everything I needed, with no hiccups, and it now works on Chromebooks. Best of all, it edits and exports to your Chromebook's internal hard drive, offline. It's also full-featured with 3D effects, titling, audio mixing and up to 4K ultra HD video exporting. Granted, to store any normal amount of video editing you'll need one that has at least 64GB, preferably 128GB or more. That means a high-end Chromebook in the range of \$500-\$1,000, but the point here is just that it even can be done. Getting the

4k exporting and slow-motion effects means paying for a \$6 add-on pack; otherwise, Power Director is free. So, it isn't the always-free software environment to which some Linux users have grown accustomed, but \$6 for Power Director's extra features is still a great value.

Now, let's talk network file management.

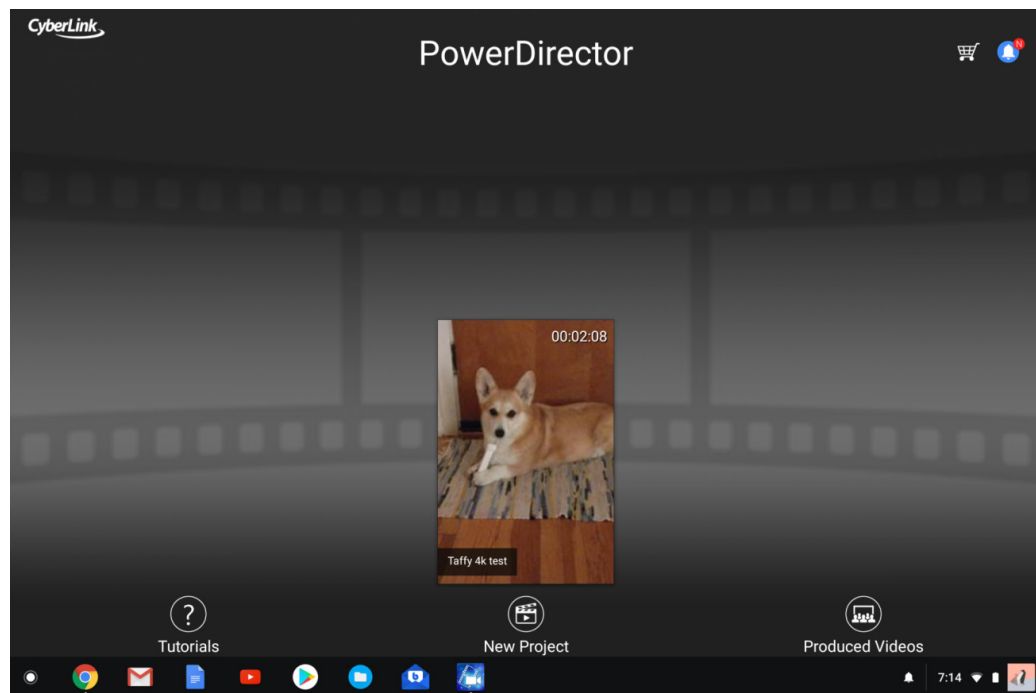


Figure 2. Power Director brings 4k Ultra HD offline video editing to Chromebooks.

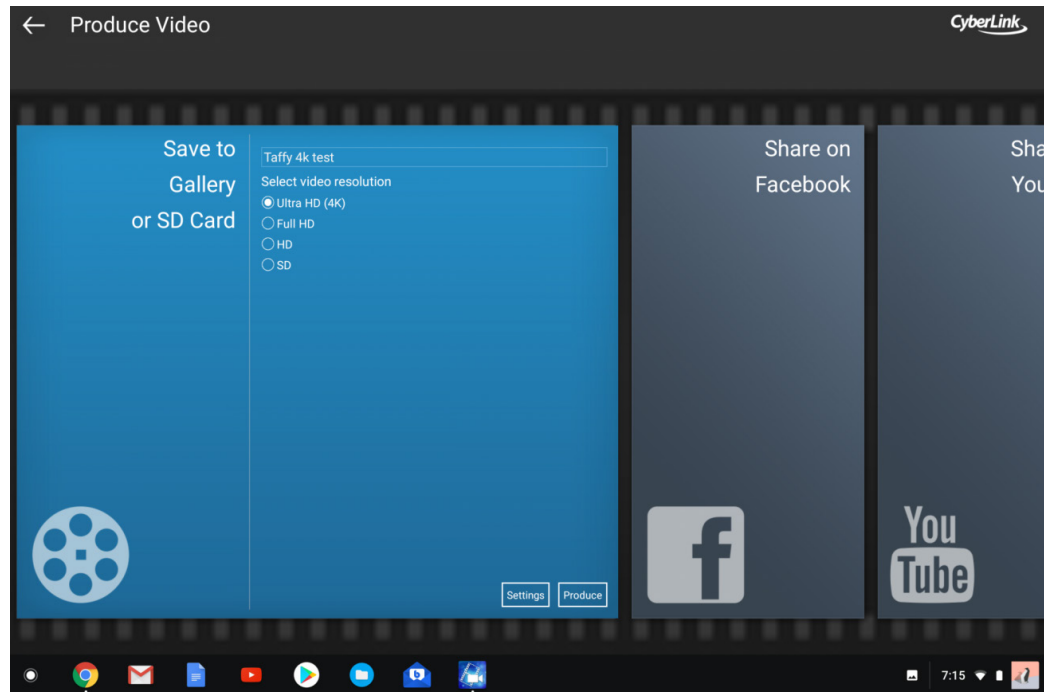


Figure 3. Export to 4k Ultra HD or lower res settings if you prefer.

As is the case with all Android apps, there are many to choose from—some great, some mediocre and some just plain horrible. I tried nearly a dozen different network file manager apps, and all were either terrible, didn't work or both, except one. I was very surprised that my favorite network file manager for my phone, ES File Explorer, simply would not function when installed on my Chromebook. This might be because my Chromebook is the Google Pixelbook and uses an Intel processor, and ES might work only on ARM processors, but I digress.

The one app I discovered that did everything right is called

Smart File Manager. It finds all of my network drives and moves files easily back and forth from all of them. So you no longer have to depend on Google Drive to store and move your files from a Chromebook. Figure 4 is a screenshot of my network view on Smart File Manager.

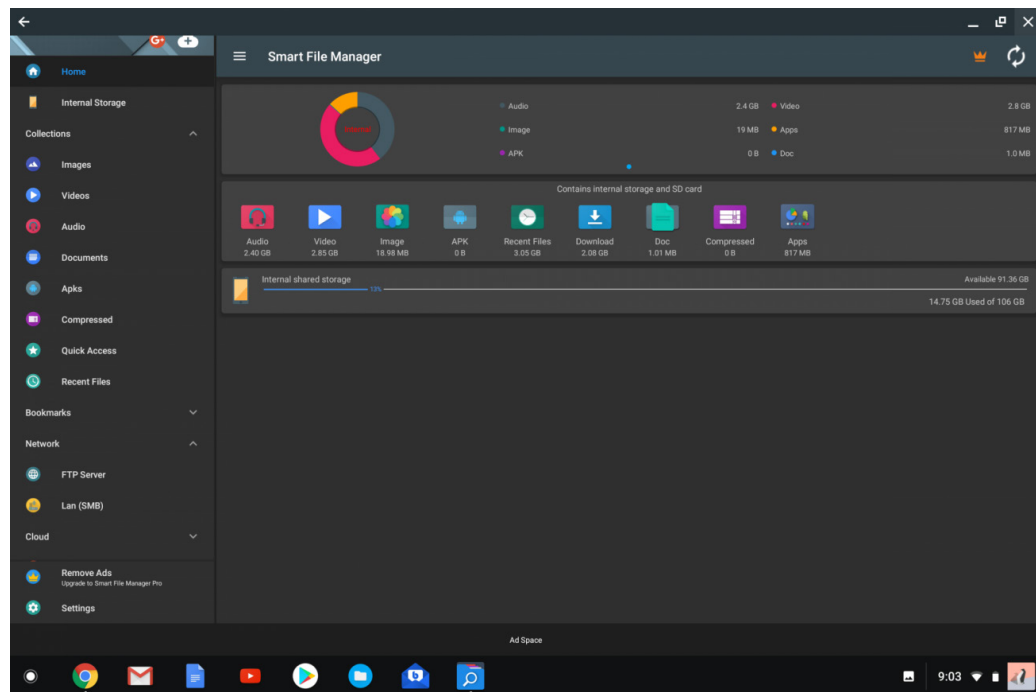


Figure 4. Smart File Manager makes it easy to move files to and from your Chromebook, via your home network.

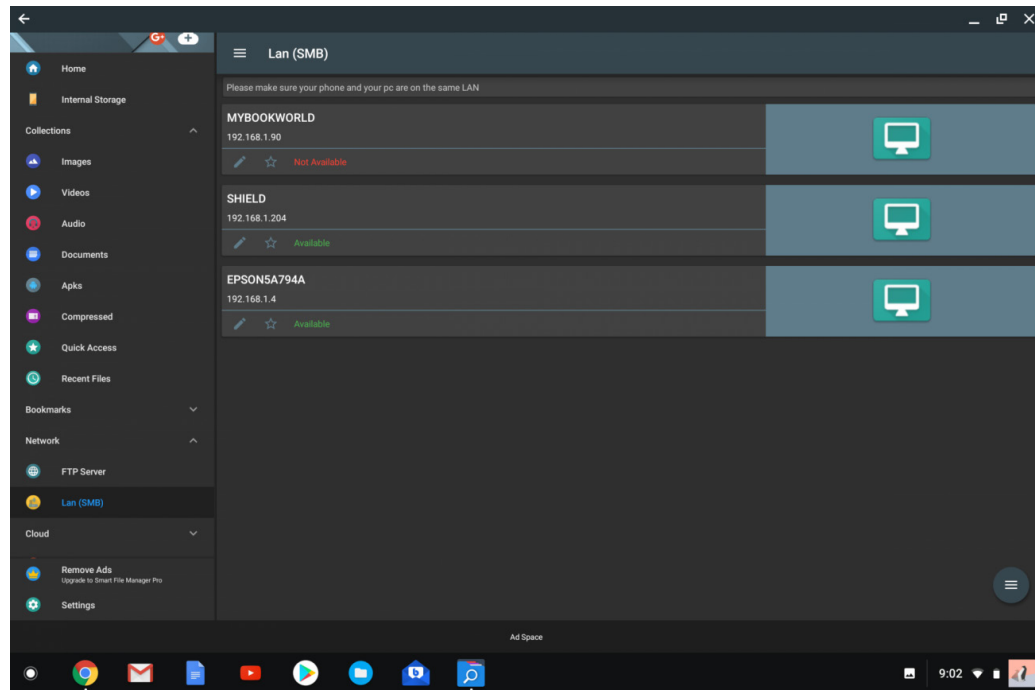


Figure 5. A user-friendly view of your network and Chromebook sources for moving files.

What about email alternatives? After trying several apps, the Blue Mail app was an unexpected surprise, as I'd never heard of it before. It was the first email app I've ever installed that detected the correct incoming and outgoing IMAP email settings automatically. All I had to do was type in my email address from my ISP (not my Gmail account). If you need to access your messages offline, this is the best Android email app I could find for a Chromebook.

Personally, I like using many of the native Chrome apps that come baked in to all Chromebooks, be it the Chrome

browser, Gmail, Google Docs, Google Hangouts and so on. It is nice, however, to know that many more options outside the Google ecosystem now exist should you desire to find them. However, the Google Play Store makes it easy to find Android apps, and many of them are free.

When you first launch an Android app, it most likely will appear in a mobile-device-size screen. When you click the resize square in the upper-right corner, it always will come with a warning that it might not function correctly in full-screen mode. I have yet to find an app I liked that had this problem, so go ahead and resize, and things probably will work as they should.

Once you open an app in full-screen mode for a Chromebook, it will default to full screen each time you open an Android app thereafter. As time goes by, this should stop being an issue, as more Android developers make screen-size detection automatic.

Tablets

Although interest in Android tablets has declined in recent years, Chrome OS is moving into that form factor with the Chrome OS experience. Acer recently introduced the first Chromebook tablet: the Acer Chromebook Tab 10. And

the first detachable laptop/tablet Chromebook, the HP X2, also is now available. These are just a few examples of the inevitable broadening of the marketing scope for Chrome OS on both ends of the economic spectrum. On the other end of this spectrum is the Google Pixelbook, which was released in November 2017. High-end specs include up to an Intel I7 Kaby Lake processor with 512GB NVMe SSD of storage, 16GB of RAM and a backlit keyboard standard. I have the Intel I5, 128GB version of this, and it's joy to use everyday. For those who prefer a traditional desktop experience, there are Chromeboxes from many manufacturers in all varieties of specs and prices as well.

Distributions

If you like your Linux distro, you can keep your Linux distro. Chrome OS is more like a Linux distro than a true OS, in that it is running on the Linux operating system. This makes sense, given Chrome's roots in the open-source Chromium project. It's also why you can run Chrome OS and Xubuntu side by side in a chroot environment. Xubuntu's Xfce desktop is the default. You can run Ubuntu instead, but Unity isn't as smooth an experience as Xfce on most Chromebooks.

Crouton

If you want, you also can go without a GUI and do everything in the terminal. It does involve switching the Chromebook to developer mode, then installing Crouton from GitHub. Once done, you can hotkey between the two, with no need to dual-boot. If this interests you, you should know that some Ubuntu software hasn't been compiled to work on ARM processors, so this option is more likely to work consistently on a Chromebook with Intel x86 or AMD64 processors. And, if you wish to return to the original Chrome OS state, it's as easy as getting out of developer mode and letting Chrome OS overwrite all of the changes you made. For more information on Crouton, see the project's GitHub page.

Crostini

There is a program called Crostini that will bring a natively running Linux terminal in a container to Chromebooks. Linux apps and/or a distro can run securely in the terminal as well. Imagine all of the developer tools you need, accessed via a terminal inside the lightweight Chrome OS? No need for Crouton to get your work done as a developer. Containers in general could be the final step in getting Chromebooks on a level playing field with Windows and

Mac. For example, any time you use an Android app on a Chromebook, you're running it in a container that isolates them to not affect the Chrome OS running on your Chromebook. Crostini does the same thing for developers, isolating what you're developing from the Chrome OS to maintain its stability. Crostini would make using Crouton unnecessary and would be much more secure, in that you would not need to enter into developer mode and chroot, like you do with Crouton. Once enabled, you would see the option to download Crostini in the settings menu on any non-managed Chrome OS device. Crostini is currently available in both the dev and beta channels of Chrome OS version 68 and is expected to arrive in the stable channel by version 69 in mid-September.

Chromebooks and Education

Another Chromebook foothold is devices for education. Apple recently made a publicity splash with the introduction of a \$299 iPad for students to use at school and home. There was one problem with this scheme. Chromebooks—that is, functional laptops with keyboards—start at \$149 and have for quite a while. A \$150 price difference may not seem like much to some people, but for school districts buying many of these in bulk on the taxpayer's dime,

Chromebooks are a sensible option.

Last year, Chromebooks made up 58% of computing devices shipped to schools, while Apple devices dropped 19%, down an embarrassing 50% from 2014, according to data from the market research firm Futuresource. Another fact to consider is that keyboards are a necessity for any classroom above the second grade, and the Chromebook's keyboards have stood up to that abuse for years now.

With everything being stored in the cloud, what the student does at school is easily retrieved and worked on at home as homework. Let's not forget the baked-in Google Docs, Gmail and Classroom that students likely already are familiar with and have been since 2012. They also are all cross-platform and free, which is something Apple's walled garden of expensive software has never delivered.

My son was the first to buy a Chromebook in my family, which was his choice, but he did ask for my advice before he bought it. That was in 2013, and he still uses it every day, long after he got his bachelor's degree in 2014. He loves it and wants to buy another one soon. He's also a millennial who previously owned a MacBook, and I'm sure he's not alone in this transition of preferences. Once he discovered he could manage his iTunes playlist on a Chromebook using Spotify Premium, he was completely sold on a

Chromebook! My son's experience with a Chromebook is multiplied by the thousands, maybe millions, worldwide who have had similar good experiences with a Chromebook. This, more than any other explanation, is why the Chromebook has flourished and will continue to do so well into the future.

Conclusion

So is a Chromebook right for you? As with most purchases, it has to provide the right combination of features for the price, and it also should be an improvement over what you have been using. Admittedly, it's not for everyone, but it's a good choice for a growing number of those who simply want an easy-to-use, safe and quick laptop experience. Did I mention that it boots up in five seconds to your login? And finally, for me, the introduction of Android apps was all the push I needed to buy one.

This leads to my view on the future of Chromebooks. The low-end budget-minded versions are more up to date, useful and visually attractive. However, the more enticing news is the production of higher-end, more useful and, dare I say, elegant-looking Chromebooks. Yes, they cost more, but they also do more. In the case of the newest-edition Google Pixelbook I own, they are beautiful pieces

of technology anybody would be proud to bring into any boardroom of a major corporation. I know that doesn't matter to some people (myself included), but it's good to see this push in great laptop design for Chromebooks.

The focus of this article has been on what the Chromebook can now do that they previously couldn't do. Wrap your brain around how this extremely light operating system is doing nearly as much as much more heavy, memory-intensive operating systems that tend to process slower and, in the case of Windows, need anti-virus and anti-malware software constantly running in the background to keep your experience safe, using resources that otherwise would go to whatever you're doing at the moment. This is what is called progress, and in the case of personal computing, Chromebooks are what progress looks like. The mission is far from complete, but it's already proving itself as a viable computer choice for many people.

There's also some speculation on the future of the Chrome and Android. Google is in the early stages of testing a new OS called Fuchsia that is not built on Linux. It's built on a new open-source microkernel called Zircon, and the focus is on one unified OS for mobile devices and laptops/desktops—or in Google's world, pulling Chrome OS and Android OS functions into one new OS that would replace both.

That is one gigantic undertaking, but if any company has the cash and patience to pull it off, it's Google. If it can do it, the new Fuchsiabook or Fuchsiaphone (my creation, but who knows) could be simply amazing! This is what progress looks like.

About the Author

Philip Raymond is a Master Control Supervisor at WFLD-Fox Television in Chicago. He has used and enjoyed using Linux for 15 years and enjoys learning about new open-source projects. You can follow Phil on Twitter [@tvphil](https://twitter.com/tvphil) or on Facebook at www.facebook.com/tvphil.

Review: the Dell XPS 13 Developer Edition Laptop

By Petros Koutoupis

A look at Dell's thin and sleek XPS 13 Developer Edition laptop that now ships with Ubuntu 18.04 LTS pre-installed.

Canonical recently made an official announcement on its company blog stating that the Dell XPS 13 Developer Edition laptop (that is, Project Sputnik) now ships with Ubuntu 18.04 LTS (Bionic Beaver) pre-installed. Upon reading this, I quickly reached out to Dell asking to review the laptop. I'm a Linux developer, and when a developer edition laptop is marketed with Linux pre-installed, I need to experience it for myself. The laptop eventually arrived, and like a child on Christmas morning, I excitedly pulled the

device out of the box and powered it up for the first time.

This is a pretty rock-solid notebook. The device is very light and easy to carry—meaning, it's mobile (which is very important in my book), thin and sleek. Not only does the device look good, but it also performs very well.

General Specifications

In my possession is the 7th generation of the Dell XPS 13 Developer Edition laptop. This generation ships with an Intel Core i7 8th Gen microprocessor. It is a four-core, eight-threaded (hyperthreaded) i7-8550U CPU operating at a 1.8GHz frequency. With this configuration, the system itself reports eight CPUs. The system is installed with 16GB of RAM.

First Impressions

Upon first boot, you're greeted with a Dell welcome screen followed by a generic set of Ubuntu-related questions (such as license agreement, keyboard layouts, timezone and so on). Toward the end, you are given an option to create a recovery USB image, which could be very handy one day. If you opt out of creating one, no worries, you can go back and

create one at a later time.

The first thing I did, after logging in to my user session for



Figure 1. The Dell Recovery Media Menu

the very first time, was run a software update.

Although this does not at all relate to the quality of the device, I did find it a bit strange that the operating system was pre-installed with both Chrome and Chromium web

browsers. I'm not sure why anyone would need both, but they both were there. If you're a Firefox user, you'll need to install it from the Ubuntu Software center.

Input Controls

One of the most important aspects of any computing device is its input controls (keyboard, mice and so on). The keyboard feels comfortable—that is, with the exception of the positioning of the PgUp/PgDn keys. Those two keys are very close to the left and right arrow keys. I'm sure, over time, I'll end up getting used to it, but during the course of my review, I constantly and accidentally pressed the PgDn key while navigating my way around in a terminal and text editor. Again, the keyboard feels nice. It's responsive, and the throwback from when you press the keys down feels just about right. Although, why is there still a Windows icon for the Super key?! I jest.

I also do appreciate the backlit keypad. You even can toggle the backlight on and off manually. This backlight also fades to off when the keys haven't been pressed in some time. Although, I don't recall what that idle time or time-out is set to.

The touchpad is very responsive as well—maybe a bit too

sensitive. I find myself accidentally closing tabs or selecting things I never intended to select. By default, Ubuntu enables natural scrolling among a few other touchpad-specific features.

The notebook comes with a touchscreen bonded to the display. I always find it a bit awkward trying to make use of a touchscreen while maneuvering between a keyboard and a trackpad, but that's just me. However, I do see the value in it when it comes to testing and debugging applications intended for mobile, embedded or web use. I did notice a couple things with the touchscreen:

1. Although it's responsive and calibrated accordingly, not all windows are created equal. I had no issue moving GNOME native windows and applications around the screen, so long as it was not touching the edges of the top, bottom and sides (I thought that was weird). But for whatever reason, regardless of where I tried to hold down to drag the window of the Chrome web browser, it just would not budge.
2. Because the physical display extends to nearly the edges of both the top and the sides of the lid, every time I went to adjust the angle/tilt of the screen (from the left side), my large fingers would activate whatever was positioned on the Dock right underneath it.

What I do find a bit frustrating is that I am not able to disable the touchscreen from the Ubuntu Settings panel, unless it is very well hidden somewhere. The only way that I believe this can be done is through the Xorg configuration files.

Input controls overall rating: 4/5.

Display

The display is absolutely amazing, and by amazing, I mean beautiful. Everything is very crisp and clean. As a software developer, I definitely can appreciate all of the available screen real estate. I live in the terminal, and more specifically, I use my preferred developer tools: vi and grep. It is a 16:9 screen scaling to a 3840 x 2160 resolution (4K). So, needless to say, there's plenty of room for me to open one or more terminal windows on the same screen.

The screen resolution is so large, some applications don't necessarily scale as well as the rest of the desktop environment. You can go to the Settings → Devices → Displays menu and change the value of the Scale field from the default 200% to something more, but some of the other applications may not comply with the changes (a good example is GIMP).

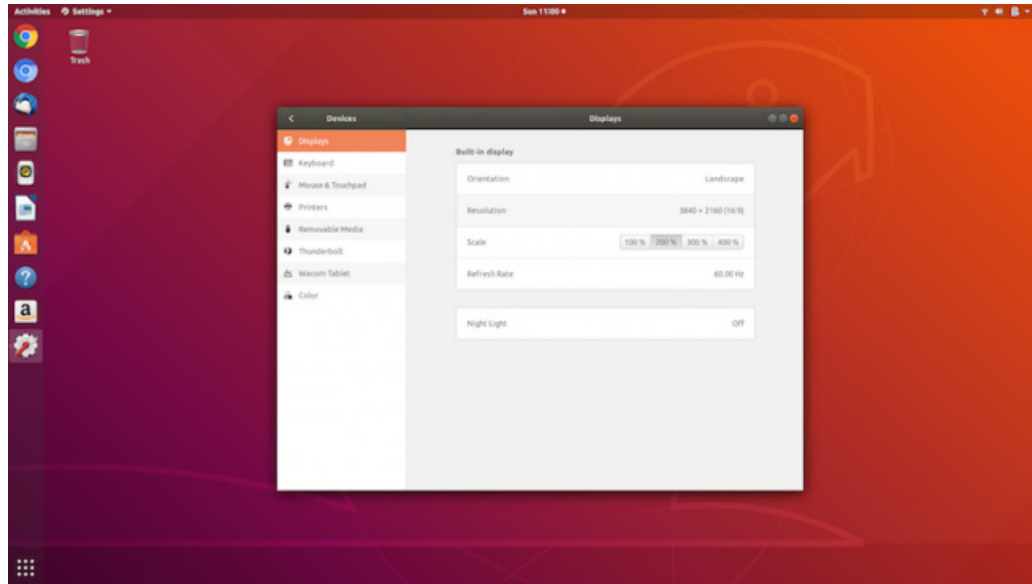


Figure 2. The Display Configuration Menu

Right before I dove into this area, I went to the Ubuntu Software Center and installed the graphic editor. The application was loaded almost as soon as the installation was complete, and it was immediately apparent that the icons and options of both trays did not scale like the rest of the operating system.

Display overall rating: 5/5.

Audio

I really enjoy the quality of the onboard speakers. I am streaming audio through it while typing this review, and it sounds pretty darn good. Everything is clear and crisp, as one would hope.

The microphone worked as expected, and the folks on the other end of my video chat were able to hear my voice with little to no interference or background noise.

Audio overall rating: 5/5.

Power Consumption

Power consumption and battery life can make or break a device intended to be used for mobile computing. If you can't get this right, what's the point? Overall, I am extremely impressed with the power consumption of this device.

To put this into perspective, I was running from battery for 30 minutes while navigating in a browser and writing my notes for this review in Google Docs, and 95% of the battery is still remaining—not bad. Of course, if I were to increase the workload on this machine, that number would quickly drop.

As one would expect, the backlight of the panel dims to help conserve energy, and you also have the option to reduce the brightness or turn off the backlight underneath the keypad. You can do other things to reduce the power consumption as well. For example, if it isn't being used, it may be to your advantage to disable Bluetooth.

Fast-forward a few days: the notebook has been off of the charger for three days now. I've been routinely going back to the device (and waking it up from hibernation) to use it for minor tasks here and there throughout the course of those same three days. The notebook is still above 60% battery. For a four-core device, this is really good.

As an added bonus, you can check battery state quickly without opening up the lid and logging in to your session. The left side of the notebook has a power gauge where by pressing a button, you are given a general and visual approximation.



Figure 3. The Visual Battery Indicator

Power consumption overall rating: 5/5.

Performance

Boot-up time was mostly reasonable. Although I didn't exactly take a stopwatch to it, it felt to me as if I was at the login screen for 15 seconds after I pressed the power button. Now, I'm not entirely sure what's going on under the hood before the operating system begins to load, but in my personal opinion, I was expecting something a bit

faster when running off of an NVMe SSD. Either way, even 15 seconds is not unreasonable. And unless I reboot after a system update that requires it, I'll never power-cycle my machines.

Waking up from a sleep or hibernate state is also very quick. Although I do not power off my notebooks, I instead close the lid to ensure that my applications and their states are still present when I reopen the lid and reawaken the device. Within a second or two, I am prompted with the login screen.

To test the system's overall performance, I decided to build three separate Linux kernels simultaneously, all different versions:

- 4.14.67
- 4.18.5
- 4.19-rc2

What really impressed me was the speed at which the system was able to untar the archives. For instance, the 4.19-rc2 gzip file was approximately 154M in size and took less than four seconds to uncompress—3.961 seconds to be exact. Not bad!

When it came down to preparing and building these kernels all simultaneously, I was surprised that the base Ubuntu image for a developer machine did not include the developer environments for things like the C library or even the kernel. I needed to install header files from `libc-dev` just to build things in C. Eh, those are minor details.

Back to building the kernels, I gave the exact same config (`x86_64_defconfig`) of the kernel to all three and ran the build simultaneously. All three completed within 25 seconds. Wow! Now, when I parallelize the builds with the `-j` option in the make command, the time dropped to less than ten seconds. I mean, holy crap, wow! This is a four-core hyperthreaded machine using NVMe. So, I would expect it to perform, and it does just that. The 16GB of memory obviously helps a whole lot.

Wireless network performance also was good and seemed to be very responsive.

Performance overall rating: 5/5.

External Device Support and Peripherals

Now, aside from a single microSD slot and a headphones jack, everything else is USB-C. This seems to be the trend

nowadays, and it makes sense now that newer devices to market all support the protocol. Even the power adaptor connects over USB-C and will occupy a single USB-C port.

But, what does this mean for expandability? It means you are required to buy adaptors and expanders to connect more devices, which includes external monitors. Dell does provide the customer with a single USB-A to USB-C adaptor, and in most cases, that may be enough. This way, you can connect your USB thumbdrive or that external hard drive—or maybe even that one developer microcontroller board to communicate with its JTAG interface over serial.

Some folks may have issues with this, but honestly, I personally don't mind. The protocol is much more superior than its predecessors, and it can sustain more connections for those that require it. Truth be told, you need to give Dell some credit here. Unlike some of its competitors, Dell is at least easing your transition from USB-A to USB-C by providing that adaptor. Those same competitors will sell you a similar adaptor for \$60 or more on their websites.

I also am pleasantly surprised that the operating system went out to my local network and found my print server with zero effort on my part. As soon as I went to printer settings, it already was listed and ready to go.

The biggest problem I have is with the webcam. The webcam is oddly positioned beneath the display (instead of at the top, as is typical). This means that in order to capture your face, you need to adjust the tilt of your screen, which leads to an awkward display of your face. And if you're on a video-conference call, everyone else will have a nice view of your fingers typing away at the keyboard. I hope future iterations of the XPS line will address this design issue

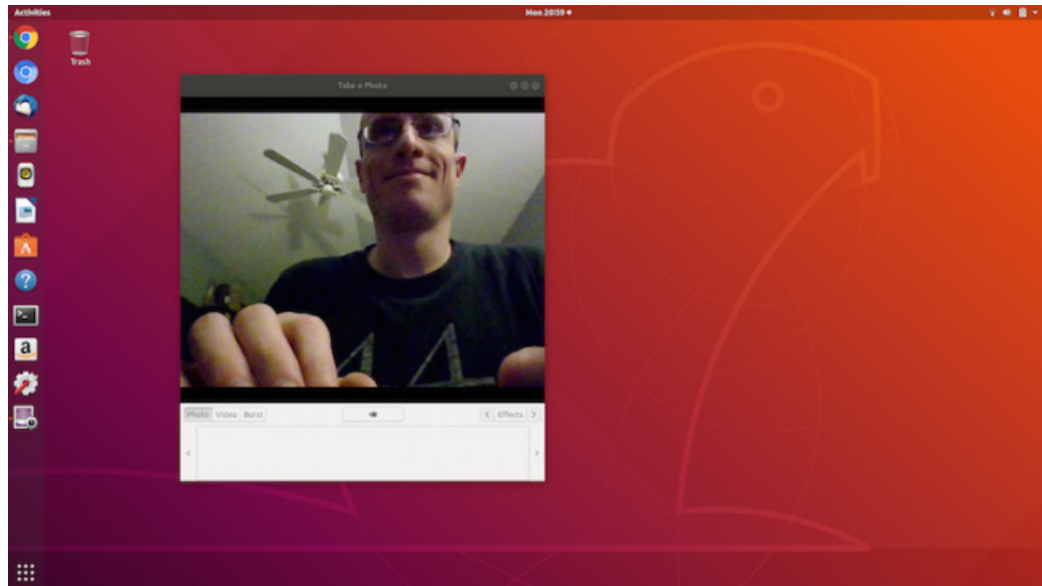


Figure 4. The Odd Placement of the Webcam

External device support and peripherals overall rating: 3/5.

And the Rest

The software integration between Dell and Ubuntu seems to stand out a lot—and I mean this in the most positive way. System updates include Dell-specific hardware/firmware patches. This is huge.



Figure 5. The System Doing a Hardware Update after Rebooting from a Software Update

I did experience a couple quirks or issues throughout this write-up. Let me state the following disclaimer before getting into the details of those quirks:

The problems I'm about to describe have nothing to do with the Dell hardware. They are focused on the Ubuntu operating system running on that hardware. I've been observing this exact same behavior in virtual machines (if applicable) and on other non-Dell physical devices.

Applications would sometimes randomly crash. I've observed this with both the Update Manager and, again, with Nautilus. I'm not sure if it's the version of Nautilus supported on Ubuntu 18.04, but regardless of the environment that I use with this particular distribution and release, the Nautilus file manager application routinely crashes and generates a "report to Canonical" message. The problem continues to occur with the latest Ubuntu package updates.

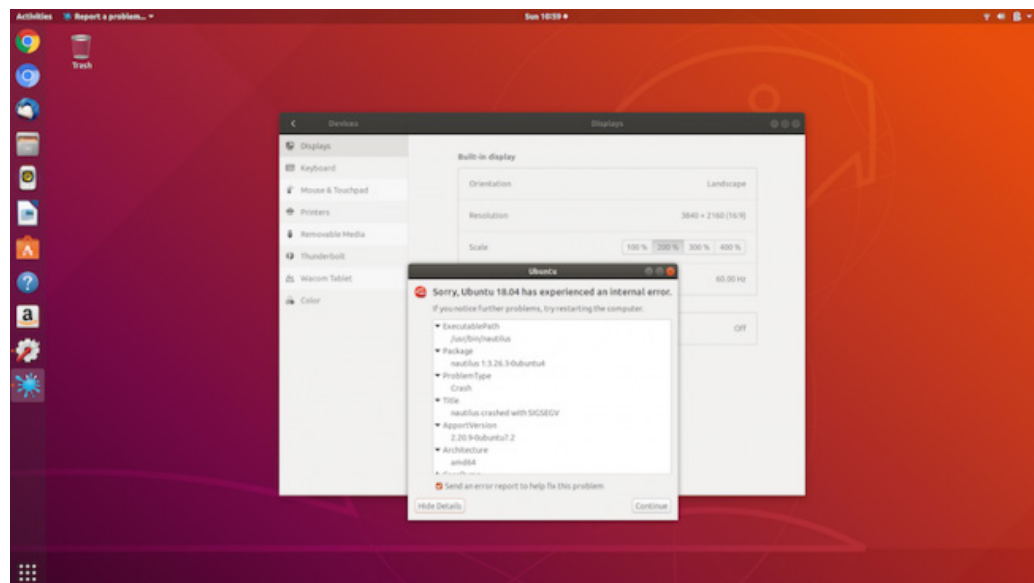


Figure 6. A Reoccurring Software Crash in the Nautilus File Manager

Another quirk relates to the almost-never-resolved Linux problem: hibernate. To clarify, by default, Ubuntu places your machine in a sleep state when it idles or if you close the lid of your laptop. After some time, the machine transitions from sleep to hibernate mode.

Sleep saves your current state into memory and places your peripherals into a low power mode. In hibernate mode, the saved state will be placed to disk, and the device will be powered down completely. Ubuntu calls this mode “suspend”.

After six attempts to wake up the device from hibernation, only five were successful. In that one case, I was not able to bring the machine back up, and I was greeted by a completely black screen with its backlight lit up. After spending four minutes pressing every key and eventually pressing the power button hoping it would do something, I gave up and held down the power button to force a system shutdown and restarted it.

In that same one case, I did do something different. I closed the lid while plugged in. I unplugged the device some time later and attempted to reawaken it. I wonder if I hit some corner-case software bug handling this transition.

Anyway, you can configure or customize the operating system's suspend settings. For instance, you can extend the

time it suspends from sleep or just disable it completely for when the device is plugged in and/or on battery power.

Software integration overall rating: 4/5.

Final Thoughts

Overall, I had a very positive experience with the 7th generation Dell XPS 13. It's a powerful machine and fully capable of handling all sorts of developer workloads. And if used in a professional environment, it's very mobile as well. You can carry it from conference room to conference room and resume your work with little to no disruption. Ubuntu is well integrated with the machine, and it shows. You can't ask for more in a developer's laptop. I definitely consider this device to be well worth the investment.

About the Author

Petros Koutoupis, LJ Editor at Large, is currently a senior platform architect at IBM for its Cloud Object Storage division (formerly Cleversafe). He is also the creator and maintainer of the RapidDisk Project. Petros has worked in the data storage industry for well over a decade and has helped pioneer the many technologies unleashed in the wild today.

Review: the Librem 13v2

By Shawn Powers

The Librem 13—“the first 13-inch ultraportable designed to protect your digital life”—ticks all the boxes, but is it as good in real life as it is on paper?

I don't think we're supposed to call portable computers “laptops” anymore. There's something about them getting too hot to use safely on your lap, so now they're officially called “notebooks” instead. I must be a thrill-seeker though, because I'm writing this review with the Librem 13v2 directly on my lap. I'm wearing pants, but apart from that, I'm risking it all for the collective. The first thing I noticed about the Librem 13? The company refers to it as a laptop. Way to be brave, Purism!

Why the Librem?

I have always been a fan of companies who sell laptops (er, notebooks) pre-installed with Linux, and I've been considering buying a Purism laptop for years. When our very own Kyle Rankin started working for the company, I figured a company smart enough to hire Kyle deserved my business, so I ordered the Librem 13 (Figure 1). And when I ordered it, I discovered I could pay with Bitcoin, which made me even happier!



Figure 1. The 13" Librem 13v2 is the perfect size for taking on the road
(photo from [Purism](#))

There are other reasons to choose Purism computers too. The company is extremely focused on privacy, and it goes so far as to have hardware switches that turn off the webcam and WiFi/Bluetooth radios. And because they're designed for open-source operating systems, there's no "Windows" key; instead there's a meta key with a big white rectangle on it, which is called the Purism Key (Figure 2). On top of all those things, the computer itself is rumored to be extremely well built, with all the bells and whistles usually available only on high-end top-tier brands.

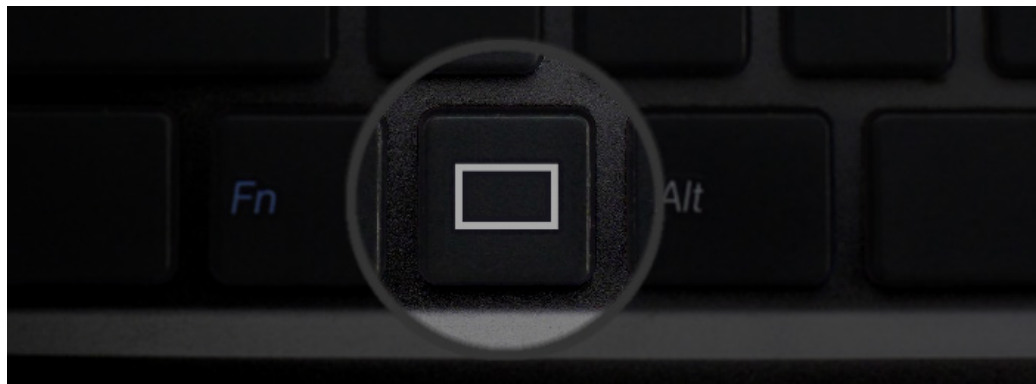


Figure 2. No Windows key here! This beats a sticker-covered Windows logo any day (photo from [Purism](#))

My Test Unit

Normally when I review a product, I get whatever standard model the company sends around to reviewers. Since

this was going to be my actual daily driver, I ordered what I wanted on it. That meant the following:

- i7-6500U processor, which was standard and not upgradable, and doesn't need to be!
- 16GB DDR4 RAM (default is 4GB).
- 500GB M.2 NVMe (default is 120GB SATA SSD).
- Intel HD 520 graphics (standard, not upgradable).
- 1080p matte IPS display.
- 720p 1-megapixel webcam.
- Elantech multitouch trackpad.
- Backlit keyboard.

The ports and connectors on the laptops are plentiful and well laid out. Figure 3 shows an “all sides” image from the Purism website. There are ample USB ports, full-size HDMI, and the power connector is on the side, which is my preference on laptops. In this configuration, the laptop cost slightly more than \$2000.



Figure 3. There are lots of ports, but not in awkward places (photo from [Purism](#))

The Physical Stuff and Things

The Case

The shell of the Librem 13 is anodized aluminum with a black matte texture. The screen's exterior is perfectly plain, without any logos or markings. It might seem like that would feel generic or overly bland, but it's surpris-

ingly elegant. Plus, if you're the sort of person who likes to put stickers on the lid, the Librem 13 is a blank canvas. The underside is nearly as spartan with the company name and little else. It has a sturdy hinge, and it doesn't feel "cheap" in any way. It's hard not to compare an aluminum case to a MacBook, so I'll say the Librem 13 feels less "chunky" but almost as solid.

The Screen

Once open, the screen has a matte finish, which is easy to see and doesn't have the annoying reflection so prevalent on laptops that have a glossy finish. I'm sure there's a benefit to a glossy screen, but whatever it might be, the annoying glare nullifies the benefit for me. The Librem 13's screen is bright, has a sufficient 1080p resolution, and it's pleasant to stare at for hours. A few years back, I'd be frustrated with the limitation of a 1080p (1920x1080) resolution, but as my eyes get older, I actually prefer this pixel density on a laptop. With a higher-res screen, it's hard to read the letters without jacking up the font size, eliminating the benefit of the extra pixels!

The Keyboard

I'm a writer. I'm not quite as old-school as Kyle Rankin with his mechanical PS/2 keyboard, but I am very picky when it comes to what sort of keys are on my laptop. Back in the days of netbooks, I thought a 93%-sized keyboard would be perfectly acceptable for lengthy writing. I was horribly wrong. I didn't realize a person could get cramps in their hands, but after an hour of typing, I could barely pick my nose much less type at speed.

The Librem 13's keyboard is awesome. I won't say it's the best keyboard I've ever used, but as far as laptops go, it's right near the top of the pile. Like most (good) laptops, the Librem 13 has Chicklet style keys, but the subtleties of click pressure, key travel, springiness factor and the like are very adequate. The Librem 13v2 has a new feature, in that the keys are backlit (Figure 4). Like most geeks, I'm a touch typist, but in a dark room, it's still incredibly nice to have the backlight. Honestly, I'm not sure why I appreciate the backlight so much, but I've tried both on and off, and I really hate when the keyboard is completely dark. That might just be a personal preference, but having the choice means everyone is happy.



Figure 4. I don't notice the keyboard after hours of typing, which is what you want in a keyboard (photo from [Purism](#))

The Trackpad

The Librem 13 has a huge (Figure 5), glorious trackpad. Since Apple is known for having quality hardware, it's only natural to compare the Librem 13 to the Macbook Pro (again). For more than a decade, Apple has dominated the trackpad scene. Using a combination of incredible hardware and silky smooth software, the Apple trackpad has been the gold standard. Even if you hate Apple, it's impossible to deny its trackpads have been better than any other—until recently. The Librem 13v2 has a trackpad that is 100% as nice as MacBook trackpads. It is large, supports

“click anywhere” and has multipoint support with gestures. What does all that mean? The things that have made Apple King of Trackpad Land are available not only on another company's hardware, but also with Linux. My favorite combination is two-finger scrolling with two-finger clicking for “right-click”. The trackpad is solid, stable and just works. I'd buy the Librem 13 for the trackpad alone, but that's just a throwaway feature on the website.



Figure 5. This trackpad is incredible. It's worth buying the laptop for this feature alone (photo from [Purism](#))

The Power Adapter

It might seem like a silly thing to point out, but the Librem 13 uses a standard 19-volt power adapter with a 5.5mm/2.5mm barrel connector. Why is that significant? Because I accidentally threw my power supply away with the box, and I was worried I'd have to special-order a new one. Thankfully, the dozen or so power supplies I have in my office from netbooks, NUCs and so on fit the Librem 13 perfectly. Although I don't recommend throwing your power supply away, it's nice to know replacements are easy to find online and probably in the back of your tech junk drawer.

Hardware Switches

I'm not as security-minded as perhaps I should be. I'm definitely not as security-minded as many Linux Journal readers. I like that the Librem 13 has physical switches that disconnect the webcam and WiFi/Bluetooth. For many of my peers, the hardware switches are the single biggest selling point. There's not much to say other than that they work. They physically switch right to left as opposed to a toggle, and it's clear when the physical connection to the devices have been turned off (Figure 6). With the Librem 13, there's no need for electrical tape over the webcam. Plus, using your computer while at DEFCON isn't like wearing a meat

belt at the dog pound. Until nanobots become mainstream, it's hard to beat the privacy of a physical switch.



Figure 6. It's not possible to accidentally turn these switches on or off, which is awesome (photo from [Purism](#))

I worried a bit about how the operating systems would handle hardware being physically disconnected. I thought perhaps you'd need special drivers or custom software to handle the disconnect/reconnect. I'm happy to report all the distributions I've tried have handled the process flawlessly. Some give a pop-up about devices being connected, and some quietly handle it. There aren't any reboots required, however, which was a concern I had.

Audio/Video

I don't usually watch videos on my laptop, but like most people, I will show others around me funny YouTube videos. The audio on the Librem 13 is sufficiently loud and clear.

The video subsystem (I mention more about that later) plays video just fine, even full screen. There is also an HDMI port that works like an HDMI connection should. Modern Linux distributions are really good at handling external displays, but every time I plug in a projector and it just works, my heart sings!

PureOS

The Librem 13 comes with Purism's "PureOS" installed out of the box. The OS is Debian-based, which I'm most comfortable using. PureOS uses its own repository, hosted and maintained by Purism. One of the main reasons PureOS exists is so that Purism can make sure there is no closed-source code or proprietary drivers installed on its computers. Although the distro includes tons of packages, the really impressive thing is how well the laptop works without any proprietary code. The "purity" of the distribution is comforting, but the standout feature is how well Purism chose the hardware. Anyone who has used Linux laptops knows there's usually a compromise regarding proprietary drivers and wrappers in order to take full advantage of the system. Not so with the Librem 13 and PureOS. Everything works, and works well.

PureOS works well, but the most impressive aspect of it is what it does while it's working. The pre-installed hard drive walks you through encryption on the first boot. The Firefox-based browser (called "Purebrowser") uses HTTPS: Every-

where, defaults to DuckDuckGo as the search engine, and if that's not sufficient for your privacy needs, it includes the Tor browser as well. The biggest highlight for me was that since Purebrowser is based on Firefox, the browsing experience wasn't lacking. It didn't "feel" like I was running a specialized browser to protect my identity, which makes doing actual work a lot easier.

Other Distributions

Although I appreciate PureOS, I also wanted to try other options. Not only was I curious, but honestly, I'm stuck in my ways, and I prefer Ubuntu MATE as my desktop interface. The good news is that although I'm not certain the drivers are completely open source, I am sure that Ubuntu installs and works very well. There are a few glitches, but nothing serious and nothing specific to Ubuntu (more on those later).

I tried a handful of other distributions, and they all worked equally well. That makes sense, since the hardware is 100% Linux-compatible. There was an issue with most distributions, which isn't the fault of the Librem 13. Since my system has the M.2 NVMe as opposed to a SATA SSD, most installers have a difficult time determining where to install the bootloader. Frustratingly, several versions of the Ubuntu installer don't let the manual selection of the correct partition to be chosen either. The workaround seems to be setting up hard drive partitions manually, which allows the bootloader par-

tition to be selected. (For the record, it's `/dev/nvme0n1`.) Again, this isn't Purism's fault; rather, it's the Linux community getting up to speed with NVMe drives and EFI boot systems.

Quirks

There are a few oddities with a freshly installed Librem 13. Most of the quirks are ironed out if you use the default PureOS, but it's worth knowing about the issues in case you ever switch.

NVMe Thing

As I mentioned, the bootloader problem with an NVMe system is frustrating enough that it's worth noting again in this list. It's not impossible to deal with, but it can be annoying.

Backslash Key

The strangest quirk with the Librem 13 is the backslash key. It doesn't map to backslash. On every installation of Linux, when you try to type backslash, you get the "less than" symbol. Thankfully, fixing things like keyboard scancodes is simple in Linux, but it's so strange. I have no idea how the non-standard scancode slipped through QA, but nonetheless, it's

something you'll need to deal with. There's a [detailed thread on the Purism forum](#) that makes fixing the problem simple and permanent.

Trackpad Stuff

As I mentioned before, the trackpad on the Librem 13 is the nicest I've ever used on a non-Apple laptop. The oddities come with various distributions and their trackpad configuration software. If your distribution doesn't support the gestures and/or multipoint settings you expect, rest assured that the trackpad supports every feature you are likely to desire. If you can't find the configuration in your distro's setup utility, you might need to dig deeper.

The Experience and Summary

The Librem 13 is the fastest laptop I've ever used. Period. The system boots up from a cold start faster than most laptops wake from sleep. Seriously, it's insanely fast. I ran multiple VMs without any significant slowdowns, and I was able to run multiple video-intensive applications without thinking "laptops are so slow" or anything like that.

The only struggle I had was when I tried to use the laptop for live streaming to Facebook using OBS (Open Broadcast Studio). The live transcoding really taxed the CPU. It was able

to keep up, but normally on high-end computers, it's easier to offload the transcoding to a discrete video card. Unfortunately, there aren't any non-Intel video systems that work well without proprietary drivers. That means even though the laptop is as high-end as they get, the video system works well, but it can't compare to a system with a discrete NVIDIA video card.

Don't let the live streaming situation sour your view of the Librem 13 though. I had to try really hard to come up with something that the Librem 13 didn't chew through like the desktop replacement it is. And even with my live streaming situation, I was able to transcode the video using the absurdly fast i7 CPU. This computer is lightning fast, and it's easily the best laptop I've ever owned. More than anything, I'm glad this is a system I purchased and not a "review copy", so I don't have to send it back!

About the Author

Shawn is Associate Editor here at Linux Journal, and has been around Linux since the beginning. He has a passion for open source, and he loves to teach. He also drinks too much coffee, which often shows in his writing. You can contact Shawn via e-mail, ljeditor@linuxjournal.com.

Review: System76 Oryx Pro Laptop

By Robert J. Hansen

Can “by hackers, for hackers” sell laptops? System76 sold an Oryx Pro to Rob, and he’s here to tell you about it.

I should start by saying that although I’m definitely no newbie to Linux, I’m new to the world of dedicated Linux laptops. I started with Linux in 1996, when Red Hat 4.0 had just adopted the 2.0 kernel and Debian 1.3 hadn’t yet been released. I’ve run a variety of distros with varying degrees of satisfaction ever since, always looking for the Holy Grail of a desktop UNIX that just plain worked.

About 15 years ago after becoming frustrated with the state of Linux on laptop hardware (in a phrase, “nonexis-

tent hardware support”), I switched my laptops over to Macs and didn’t look back. It was a true-blue UNIX that just plain worked, and I was happy. But I increasingly found myself frustrated by things I expected from Linux that weren’t available on macOS, and which things like Homebrew and MacPorts and Fink could only partly address.

My last MacBook Pro is now four years old, so it was time to shop around again. After being underwhelmed by this generation of MacBooks, I decided to take the risk on a Linux laptop again.

Oh my, an awful lot has changed in 15 years!

System76

[System76](#) is a Denver-based firm with a “by hackers, for hackers” ethos. It’s not the first outfit to have tried to deliver on this promise, nor will it be the last. It follows in a long line pioneered by Red Hat and VA Research, and it will continue in the future with businesses yet to be founded. At this moment in history though, System76 seems to be doing a pretty good job of maintaining that standard.

Inquiries

My initial contact with System76 came by visiting the website and requesting a quote for one of its third-generation Oryx Pro models. The sales staff were responsive, polite and didn't seem to have their personalities obliterated into uniform perfection like the Stepford Salesforce of Lenovo or Dell. I also never caught a whiff of a hard sell from any of them. On three occasions just before being able to put down my hard-earned dinero on an Oryx Pro, my life went sideways, and my laptop fund went to pay for strange emergencies that arose out of nowhere, but the System76 sales staff were cheerfully uncaring about this. The impression I got was they believed they knew were going to miss a sale right then, but whether they missed it forever depended on how they behaved in that instant. It's an enlightened view from which more vendors could stand to learn.

Sales

At last, my laptop fund regenerated, and there were no emergencies on the horizon. I visited the System76 site again and discovered in the intervening months that a new generation of the Oryx Pro had been announced, and the

first 100 pre-orders would receive some nice swag. Judging from the swag I received (mostly a nice-looking promotional poster that's actually worth framing and putting on your cube wall), I was one of the first 100. I placed my order May 7, 2018, and was told shipments would begin the first week in June.

A couple minor problems arose. The first was that, as tends to happen with pre-orders, the new units were not available quite on schedule. The second was that System76 wasn't proactive about informing me of the delays. I was originally cited a delivery date of June 11th, but I didn't receive mine until June 15th. In the grand scheme of things, this was a minor issue—I've had far, far worse delays from much bigger vendors. Still, the fact that it was on me to ask about shipments, instead of them telling me there would be a four-day delay was an unforced error on their part.

Price

It's sweet hardware, and it's priced like sweet hardware. My laptop came in at \$2,704 (including expedited shipping).



Figure 1. Unboxing, Part 1



Figure 2. Unboxing, Part 2

Linux Laptop 2018 Buyer's Guide



Figure 3. Unboxing, Part 3



Figure 4. Unleashed!

Hardware

The new fourth-generation Oryx Pro is what was only a year ago called a “desktop replacement”. But that class of computers refers to boat anchors that were unpleasant to lug around in a messenger bag, not a slim machine that’s approaching the dimensions of a MacBook. At 15” wide, 10” high, and 3/4” deep, weighing less than 4.5 pounds, it’s closer to an airweight than a boat anchor. (That’s 38cm by 26cm by 2cm and just under two kilos, for you nerds out there in civilized countries that use proper measurements.) And packed into this form factor is a 4.1GHz i7-8750H with six cores and 12 threads, 32 gigs of DDR4 RAM at 2400MHz, a half-terabyte NVMe SSD, and—Maestro, cue the drumroll—an 8GB NVIDIA GTX 1070 with a 15.6” 4K HiDPI display. This thing makes the Mac Retinas look jagged, and that’s not something I ever thought I’d say.

The usual other things round it out. For video, it has HDMI and two DisplayPort 1.3 outputs, two USB 3.1 Type-C connectors, two USB 3.0 Type-A connectors (one of them powered), audio and mike jacks, gigabit Ethernet and 802.11ac WiFi up to 867Mbps. Oh yes, and Bluetooth. On the 17” models, you also can get Thunderbolt 3, but this isn’t an option on my 15” model. All of these are pretty much what you should expect on any modern laptop, really.

The keyboard is what the kids today call a chiclet, but it has absolutely nothing in common with the chiclet keyboards I remember. People hated the IBM PCjr chiclet keyboard, but this one is as comfortable as any laptop keyboard I've ever used. The scissor switches are responsive, and the keyboard itself is nicely backlit by a rainbow of LED lights. It's a very nearly full keyboard too, with a full-size numeric keypad. Some buttons are combined with others and accessed via function key-presses, but that's to be expected. The keyboard gets high marks.

Mouse support is provided via a trackpad with two buttons, which is one of the very few mis-designs in the hardware. Although two-button mice are better-understood by casual and business users, a lot of hard-core Linux hackers like the third mouse button—myself included. The screen bezel is a little larger than I'm accustomed to seeing on a modern laptop, but if that's the price I pay for this crisp 4K HiDPI display, I consider that affordable.

There's an integrated webcam that works well out of the box with Google Hangouts, Google Meet and Skype. I stopped testing it at that point and reached for a piece of electrical tape to cover it, and while cutting off a piece of tape, I realized the final mis-design. In 2018, when we're all so keenly aware of our privacy and how malware can hijack a webcam, all vendors should place sliding apertures over their webcams. Getting video should never just

be about turning it on in software. There also should be a physical action performed by the user involved—something as simple as sliding away a cover.

Bezel, no third mouse button, no webcam physical aperture—if those are my only complaints about the hardware, I think System76 is doing a pretty good job.

Software

The Pop!_OS is Ubuntu with a skin job, but it's a pretty nice skin. Scratch the surface, and you can find standard GNOME underneath, which is in my mind a positive thing—all those skills you've developed on other distros will transfer over to Pop!_OS nicely. The app store takes visual inspiration from Apple's, but it could stand some better curation. Clicking on the "Games" category gives you a nice list of them, but there's no facility to read user reviews or choose what kind of games you're interested in. Although graphically it's heads and shoulders beyond the package tools of yesteryear, usability-wise it still could stand improvement. Given System76 has committed to making Pop!_OS a first-class hacker distro, I suspect the app store experience is pretty low on the list of priorities—but really, it would be such an easy way to distinguish it from Ubuntu and its other derivatives.

My biggest complaint with Pop!_OS is that it's almost a dark theme but isn't. "Dark muddy" might be a better way to describe the color scheme.

Still, as mentioned earlier, it's all GNOME under the hood, so you can install whatever theme you're accustomed to.

As far as development tools, it seems to all be standard Ubuntu 18.04 repositories, so I won't rehash it except to say that it offers what you expect: GCC 7.3 and 8.0.1, GNAT, Golang, OpenJDK, Mono and the like. The Mono libraries are out of date (4.8, whereas the current is 5.12), but that's on Ubuntu, not Pop!_OS.

Sound and Video

Sound-wise, the Oryx Pro is a little bit of a letdown. There's been so much good stuff that describing the speakers as mediocre feels like a criticism. They're not bad speakers, mind you, they're just not going to impress you much. It's a laptop. It's really, really hard to put good speakers in a laptop. I compromise with a USB headset and everything's great. I've also had fine results with a pair of external USB speakers.

Video-wise, the Oryx Pro is a docile little lamb up until it turns into the Stay-Puft Marshmallow Man and starts

stomping New York flat. It ships with two different video chipsets: one an onboard low-power set by Intel and the other the aforementioned NVIDIA GTX 1070 with 8GB RAM. When you engage this monster, this machine stops being a laptop. I speak from experience. An hour of it in my lap was enough to leave my left thigh with first-degree burns. You're aware it's hot, but you tell yourself that you can ignore it. Then you shut down an hour later, look at your leg and wish you hadn't ignored it. The price of machismo, I guess.

The Intel chipset is sufficient for pretty much anything short of intensive 3D, 4K gaming or mining cryptocurrency. If you want to use the HDMI or DisplayPort external jacks, you'll need to switch to the NVIDIA chipset. Switching between chipsets requires a reboot and a surprisingly long wait. My suspicion is some firmware is getting flashed somewhere. By "surprisingly long wait", I mean that I've seen it take up to 20 seconds more to reboot on a chipset switch than to reboot without a chipset switch.

Battery Life

Power is supplied by a pretty standard brick that ends in the expected barrel plug. The trend nowadays is for laptops to be powered by USB-C or Thunderbolt, but really, I don't care much about that. What I care about is whether

the vendor-supplied power cable is long enough to be useful, and there we're on good ground. This contributes to the overall weight, of course, which is why so many vendors are intent on giving you power cables that aren't long enough to let you be more than three feet from a socket. System76 is having none of that: you've got about ten feet of distance to work with.

According to System76, the Oryx Pro's battery stores 55 watt-hours (~200 kilojoules) of energy. That's the good news. The bad news is twofold: one, power draw is significantly higher than I'd expect, and two, the onboard battery monitor is completely useless.

I've been composing this article on my System76 laptop in battery-saver mode. The screen is at minimum brightness, the graphics are being provided by the Intel chipset, and I'm avoiding anything that's especially power-hungry. Still, after just 70 minutes, I've dropped from a 98% charge to a 60% charge—assuming I can trust the battery monitor, which I really can't. 70 minutes ago it told me I had 92 minutes of charge remaining; now it tells me I have two hours and seven minutes.

Whatever. The GNOME battery applet always has been painfully inaccurate, in my experience, and that's on GNOME, not System76.

Here's what I can tell you: running purely on battery on a power-saving profile and reducing my power-hungry apps, I've run this laptop for three and a half hours before going dry. That's a significant step below what Apple's getting with its MacBook line. I hope System76 invests in improving Linux and GNOME's power infrastructure, because we can do better than this.

Like other vendors, System76 has done away with the user-swappable battery pack. It used to be that if I need more battery life I could carry a spare battery, but apparently that ship has sailed.

Are we done with this? Good. Hold on while I find a socket, I'm going to go plug this in.

Support

Here's something that might surprise you: my laptop is defective.

Yes, it's defective. That's not unheard of in first-shipped units. Every week or so, it'll spontaneously reboot due to a hardware fault. These reboots are infrequent enough that it's not severely impacting my work, but it still needs addressing, and that's given me a good opportunity to explore System76's support offerings.

Let me give the bottom line first: they're human beings and they care. That's both good news and bad news. It's good news, because human beings who care are so much better than all other alternatives that it's like comparing a supernova to a firecracker. It's bad news, because for things really to get screwed up, you need the involvement of people who are so fervently committed to getting things right, they don't notice they're digging the hole deeper.

I reported my first bout of reboots, along with a copy of my system log for 30 seconds prior to reboot, via the web page the afternoon of June 20th. A few minutes after noon the next day, System76 had approved a no-questions-asked return. On June 22, a customer service rep named Aaron told me "We are shipping your replacement part and will provide you with a tracking number as soon as it is available."

Remember how earlier on when shipments were delayed they didn't inform me about it? Yeah, that happened again. On June 26th, I asked them, "Where is this laptop? I've received no tracking information for a product you said was shipping four days ago."

About an hour later, Emma informed me, "The replacement laptop will take some time to ship, because we are out of stock and awaiting the 4k display, which is expected to arrive the week of July 10th. We are sorry for the delays. We

were just notified about the delays and apologize for this inconvenience.”

On June 22nd, I was told it was shipping, not “we will ship it as soon as new stock comes in”, but that it was shipping. Then, after it became clear there was a delay in new arrivals, they didn’t reach out to let me know. Instead, I found out four days later that I wouldn’t be receiving my replacement for two weeks.

I complained loudly. Carl, the head honcho at System76, responded to me directly and politely. He took responsibility for the error. System76 assures me it has changed the response system so the company no longer will be sending “we are shipping” notifications ahead of, well, you know, systems actually shipping.

Let me make it clear, I believe Carl. I also think Emma and Aaron and everyone else I’ve interacted with are good people who genuinely want to deliver the best user experience possible. I don’t think my experience with System76 represents its character as a company, except insofar as it represents a company going through growing pains as it adjusts to a level of demand it wasn’t expecting.

And really, for how sweet this hardware is, I completely understand the company getting swamped.

The final question is, “if I had the \$2,704 to spend again, would I be better served with an System76 Oryx Pro, a MacBook Pro or a Dell XPS?” And on balance, even taking into account the support growing pains, I can say without a shadow of doubt, I would give my money to System76 again.

And I'll also still be pestering System76 to do better. Because once the support infrastructure is cleaned up, believe you me, System76 is going to be giving everybody else in the Linux laptop space a run for their money.

The Takeaway

Pluses:

- A desktop replacement laptop in a near-MacBook form factor.
- i7-8750H with six cores and 12 threads.
- Up to 32GB RAM, and a wide variety of HD options including large NVMe SSDs.
- 55Wh battery, ~3-hour life under real-world conditions.

- Pop!_OS is a nice-looking Ubuntu 18.04 derivative.
- GTX 1070 and Intel GPUs.
- Backlit near-full-size keyboard with numeric keypad.
- Lots of USB ports, including two USB-3.1 Type-Cs.
- Thunderbolt on the 17" model.
- 15" models offer 4K HiDPI displays, which are amazingly crisp.

Minuses:

- Sales and support departments are experiencing growing pains.
- No third button on trackpad.
- No physical aperture on webcam.
- Screen bezel slightly larger than expected.
- Laptop gets dangerously hot when the GTX 1070 kicks in.

Recommendations:

- If you've got the money, this is the best thing I've found for dedicated Linux laptops.
- Be patient with System76's staff. They're having growing pains.
- Tell them I sent you.

About the Author

Rob Hansen ([@robertjhansen](https://twitter.com/robertjhansen) on Twitter) started using Linux in October 1996 and hasn't looked back since. He graduated from Cornell College in 1998, went on to graduate school at the University of Iowa, and he continues to promise his family he'll someday finish his PhD. Until then, he's saving the world with IronNet Cybersecurity where he enjoys curious pastimes like speaking about himself in the third person while not speaking for his employer.

Advice for Buying and Setting Up Laptops When You're Traveling or On-Call

By Kyle Rankin

Why stress over losing that expensive personal or work laptop? Buy a cheap one for risky situations.

[In a previous article](#), I wrote about how to prepare for a vacation so you aren't disturbed by a work emergency. As part of that article, I described how to prepare your computer:

Even better than taking a backup, leave your expensive work computer behind and use a cheaper more disposable machine for travel, and just restore your important files

and settings for work on it before you leave and wipe it when you return. If you decide to go the disposable computer route, I recommend working one or two full work days on this computer before the vacation to make sure all of your files and settings are in place.

It turns out that this advice works not just for travel but also for a laptop you take with you while on call. So in this article, I elaborate on the above advice and describe some strategies for choosing and setting up an appropriate laptop to take with you while on call or traveling.

Why Choose a Different Laptop?

I was faced with the dilemma of choosing a travel laptop when I went on vacation a few months ago. I needed to be reachable while on vacation, just in case, but I knew I didn't want to lug around and cross borders with an expensive company laptop. There are a number of reasons why this is a good idea, and most of the reasons you would want to use a separate, cheap laptop for travel also apply for an on-call laptop.

Less Concern over Loss, Damage or Theft

Although it's true that your laptop might get lost, stolen or damaged while you commute to work, it's much more likely to happen outside your normal work routine. While you are on call, you might take your laptop to restaurants, bars, events or a friend's house, and because you are outside your normal routine, it's more likely that it will be stolen or that you might accidentally leave it behind. Also when you are commuting to work, you likely have some kind of backpack or case for your laptop, but outside work, you may be more likely just to throw your laptop in the trunk of your car.

While traveling, especially traveling abroad, you are most definitely outside your normal routine, and a laptop is even more likely to get lost, damaged or stolen. The more expensive laptop you have with you, the more enticing of a target, and the more you have to lose. Also, with increased security around airports and customs these days, laptops are more likely to be inspected, confiscated or forced into checked luggage. Plus, if you do have to put your laptop in checked luggage, these days, you must lock your luggage with keys that security agents can unlock. Unfortunately, there are many stories of unscrupulous airport employees who have taken advantage of this fact to steal high-value items from luggage while it's out of its owner's possession.

An Immediate Backup for Your Work Laptop

Having a second laptop that's ready at any moment to take over work duties adds an extra backup in case your work laptop itself breaks. Instead of being out of commission while you are waiting for a replacement, you immediately can resume work on your backup. It also provides you with a backup in case you leave your work laptop at the office.

How to Choose Your Laptop

The key to a good on-call or travel laptop is to get something cheap. As computers have continued to get faster, the fact is that many people can get their general work done (especially in a pinch) with laptops that are many years old. This is especially true on a Linux desktop, even if you aren't someone who spends a decent amount of time on a terminal.

Used Thinkpads are a great choice for travel laptops, because they have good Linux compatibility and are rugged and easy to repair with replacement parts that are easy to find. Because so many organizations have used them as company laptops, you almost always can find a used one cheap on an auction site. Keep an eye out for a model that

is listed as having no OS. Those laptops tend to be cheaper because people want to avoid having to install an OS, but as Linux users, we would just overwrite the OS anyway! I've consistently found that if I'm patient, I can get a Thinkpad with reasonable specs for less than \$50 on auction sites. If you are willing to splurge on extra RAM or an SSD, these old machines can be surprisingly speedy.

Another option, especially if you want a more portable laptop, is a Chromebook. Although these machines normally are designed to run a limited, secured OS that centers on Google services, they also can run Linux well once you switch into developer mode. Some people use cheap Chromebooks as their default travel computers since they just want to check Gmail and browse the web while traveling. Personally, I found a used Acer C710 for \$40 and was able to add RAM and an SSD from a spare Thinkpad, and it turned out to be a rather capable Qubes-compatible machine.

Setting Up Your Laptop

I use Qubes both on my work and personal laptops, and I've long used its built-in backup and restore tool whenever I travel to make sure I have a fresh backup in case my laptop is lost or stolen. Now that I rely on a separate

laptop for travel, I just restore that fresh backup onto my travel machine and test it by working on it for a day before the trip. This also means I can selectively restore only the files and settings (appVMs in my case) that are relevant for the situation. In the case of its use as an on-call computer, I don't have to worry as much about fresh backups as long as all of my VPN, SSH and other credentials are kept up to date.

Since most people don't use Qubes, just take advantage of whatever tool you prefer to back up your laptop (you do back up your laptop regularly, don't you?) and restore onto your spare computer as regularly as you need to keep important files up to date. Given that you are doing this to protect against the laptop being lost or stolen, be sure to enable full disk encryption when you install the OS to help protect your sensitive files just in case. For those of you who are extra security-conscious, you can take the additional step of wiping and re-installing your OS whenever you return from a long trip, just in case you are worried about any malware that found its way on your computer while you were on untrusted networks.

Conclusion

In general, I highly recommend selecting a cheap laptop for your on-call and travel computer. You will find you

have extra peace of mind knowing that not only will it be inexpensive to replace your laptop if it's lost, broken or stolen, but also that you when you return home, you can get on your regular computer and get right back to work.

About the Author

Kyle Rankin is a Tech Editor and columnist at Linux Journal and the Chief Security Officer at Purism. He is the author of Linux Hardening in Hostile Networks, DevOps Troubleshooting, The Official Ubuntu Server Book, Knoppix Hacks, Knoppix Pocket Reference, Linux Multimedia Hacks and Ubuntu Hacks, and also a contributor to a number of other O'Reilly books. Rankin speaks frequently on security and open-source software including at BsidesLV, O'Reilly Security Conference, OSCON, SCALE, CactusCon, Linux World Expo and Penguicon. You can follow him at [@kylerankin](https://twitter.com/kylerankin).

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