



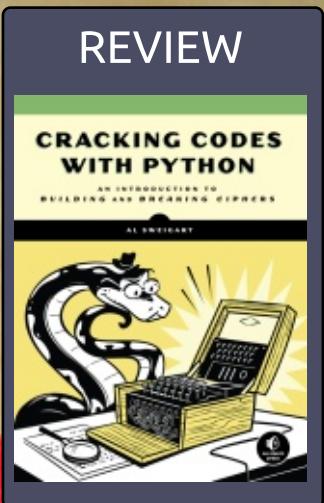
# Full Circle

THE INDEPENDENT MAGAZINE FOR THE UBUNTU LINUX COMMUNITY

ISSUE #132 - April 2018



REVIEW

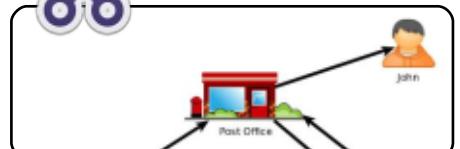


## MULTI-BOOT LINUX TEN DISTROS ON ONE USB STICK

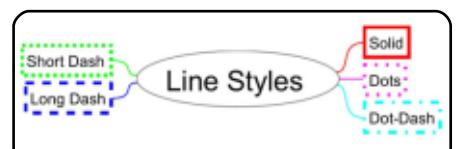
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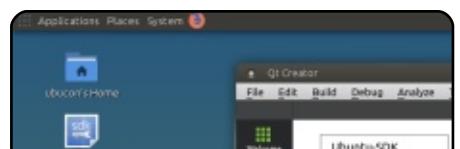
## HowTo



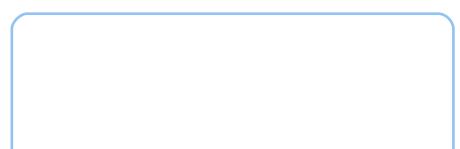
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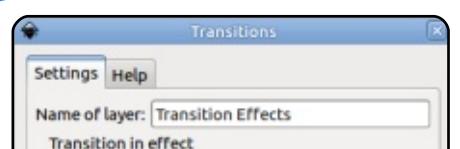
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## Graphics



# Full Circle

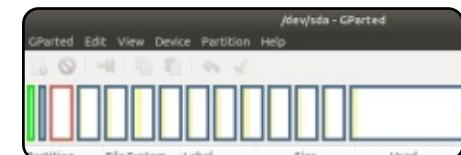
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#An alias to make the ls command more detailed  
alias ls = "ls -la --color=always --classify"

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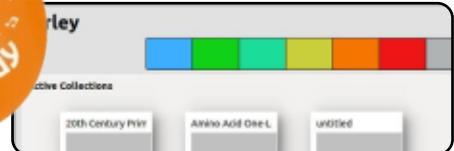
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### Edit Field

You may add a new database field to this data entry form by completing the bottom. When you add a new field, it will automatically be appended to the types available, you may view the [Field Types video \(5 min\)](#).

Select a Type of Field

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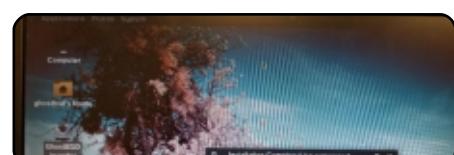
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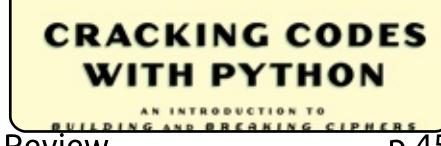
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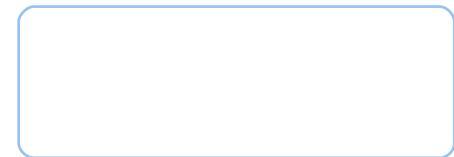
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# EDITORIAL

## WELCOME TO THE LATEST ISSUE OF FULL CIRCLE.

Well, plenty to write about this month. First, we have the return of the man, the legend, Greg Walters. Yes, he's back and with more Python. Second, we have the return of Miguel and his Ubuntu Touch series. This was put on hold while the Canonical Ubuntu Touch died off and the UbPorts Touch settled down in its place. Miguel is confident that what you'll learn now will be applicable to UbPorts Touch. Of course, as ever, we still have Freeplane, Inkscape, and the others. No Great Cow Basic this month, but it will hopefully return next month.

Unfortunately, we have to say goodbye to Charles McColm who's been with us for years with his Linux Labs column and KODI stuff. This month is a stand-in Linux Labs column, which will be the last one. We wish him all the best, and the door is always open for his return.

Elsewhere in this issue we have our cover story of how to boot TEN Linux distros from one USB stick, SJ has written a short piece comparing Linux and BSD, and I've fallen down the rabbit hole that is Dwarf Fortress. You may have heard of it as it was the inspiration for a little game called Minecraft. I couldn't possibly write a tutorial that does Dwarf Fortress justice, so I'm just showing you how to get this behemoth up and running.

**It's our birthday!** Yes, it was ELEVEN YEARS AGO that the first Full Circle hit the virtual Internet shelves. I was hopeful of reaching eleven issues. I never thought it'd be eleven years! With a birthday issue always comes a survey to see what you good people think of us. This time I've tweaked the questions to ask more about what you do with Ubuntu, and other distros, and (of course) what you like/dislike about FCM. The link to the survey is: <http://bit.ly/fcm2018>.

**All the best, and keep in touch!**

Ronnie

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# NEWS

Submitted by Arnfried Walbrecht



## FULL CIRCLE 2018 SURVEY

**It's that time of the year again where we ask what you think of FCM, Ubuntu, and Linux.**

Some questions are a requirement, some you can skip over if not applicable.

Your answers will help shape Full Circle, so please use your constructive criticism. If you don't tell us what you think, or what we're doing wrong, then we won't know.

**Survey URL:**  
<http://bit.ly/fcm2018>

## LINUS TORVALDS RELEASES LINUX KERNEL 4.16

I guess Linus Torvalds doesn't like to make tons of jokes. That's why after shipping seven release candidates for Linux kernel 4.16, he decided to released the final kernel on April Fools' Day. He might have shipped RC8 just for the heck of it, with no changes, but that's not his style.

At the time of RC7 release, he called it a bigger release than usual. About half of the code update was networking. The final release looks a lot like RC7. There are many usual driver updates as well. "If it wasn't for networking, it would all be very small and calm," Torvalds said in his announcement.

Overall, Linux 4.16 has been a heavy release with improvements and fixes for various architectures, drivers, etc.

A lot of work has been done to tighten the security with the help of Spectre and Meltdown fixes and

code cleanups.

On the CPU front, improvements have been made to bring support to newer features. There were RISC-V updates, KVM support for AMD Secure Encrypted Virtualization, mainlined Oracle DAX driver, etc.

Work has also been done to improve the support for Cannonlake Gen 10 graphics, Jetson TX2 display, and AMDKFD improvements.

Source:

<https://fossbytes.com/linux-kernel-4-16-released-features-download/>

## "SAFESPACES" IS THE FIRST OPEN SOURCE VR DESKTOP ENVIRONMENT FOR LINUX

When it comes to VR, we are mostly familiar with Google Daydream and other popularized names. But VR has made its way into the Linux as well. Although, people's experience of things like

SteamVR hasn't been that great.

But how about getting your hands on a Linux desktop environment in virtual reality? The minds who developed the Arcan display server are now up to something new: Safespaces.

It's a 3D/VR desktop environment currently in development. It's designed to run on top of the Arcan display server. You can see it in action on a VR headset compatible with OpenHMD.

According to a blog post, the Safespaces is designed in a way that its code can be reused with little changes. The developers have made sure they don't end up imitating or repeating the design model of Windows, Android, Xorg, etc.

The details of the open source VR desktop are available on GitHub. The developers warn that while testing the infant project, you might want to vomit. So, keep a bucket at hand.

The idea of using a Linux desktop in VR sounds good. But in reality, it's going to be a lot more than just playing games and watching roller coaster videos. It would be interesting to see how people manage to use their keyboard while putting on a headset unless one is a trained typist.

Source:

<https://fossbytes.com/safespaces-first-open-source-vr-desktop-linux/>

## LINUX 4.17 SHREDDING 500,000 LINES OF CODE, KILLING SUPPORT FOR OLDER CPUs

Whenever a new Linux kernel is released, it adds tons of new code to support some new hardware. Coupled with driver changes, fixes, and networking code, each release gets bulkier by thousands of lines of code.

In case of upcoming Linux 4.17, the kernel is expected to lose some weight. This change will take place as this release will drop the support for a number of old CPU

architectures, like Blackfin, Tile or MN10300.

Along with the removal of CPU ports, the drivers exclusive to them will also be kicked out of the kernel's code.

From the above list, architectures like Tile, MN10300, and Blackfin are still being shipped in some products with older kernels. However, they won't be updated to newer Linux releases.

Unicore32 and Qualcomm's Hexagon are two more architectures that are facing the risk of losing support; they both have outdated GCC releases. However, their developers have promised to improve the situation.

As a result of this change, Linux 4.17 kernel will ship with 500,000 lesser lines of code. Currently, the kernel has 20.3 million lines of code.

Source:

<https://fossbytes.com/linux-kernel-dropping-support-older-cpus-reducing-size/>

## 

There is a new version of Firefox for experiencing virtual and augmented realities. Known as Firefox Reality, the new open source web browser can work on stand-alone AR and VR headsets.

It's not the first in line; dedicated browsers for VR already exist. We have Edge on Hololens, an experimental Chrome version for DayDream, and more.

Just like the normal Firefox, the open source web browser is designed to work across different platforms rather than limiting it to one or two headsets. However, there is no word from Mozilla about the platform compatibility.

Mozilla said that they've built the Firefox Reality from scratch and worked hard to bring the browser from their years of experience and the technology they had put into Firefox Quantum. While they aren't entirely aware of the privacy implications of mixed

reality, privacy is one of the prime focal points during the development.

Mozilla puts emphasis on the fact that web browsers will play an important role in shaping the future of AR, VR, and mixed reality. In the past, they've already added WebVR support with the release of Firefox 55. Firefox Reality is their effort to bring some openness in the mostly walled garden of the 'reality' ecosystem.

Source:

<https://fossbytes.com/mozilla-firefox-reality-vr-ar-browser/>

## VALVE INSISTS THERE'S STILL LIFE IN STEAM MACHINES AND LINUX GAMING

Valve has posted a spirited defence of both Steam Machines and the future of gaming on Linux on its Steam Community forums.

Valve's response comes after news that the company had removed prominent links on its Store to Steam Machines. These are compact, console-like gaming

PCs that run a customised version of Linux called SteamOS.

Many people took Valve's move as a sign that the company was giving up on Steam Machines, as well as SteamOS, and while these were rather niche products, many people who were looking for a viable gaming alternative to Microsoft's Windows 10 operating system were disappointed. The forum post, written by Valve employee Pierre-Loup Griffais, insists that the removal of any reference to Steam Machines was simply "a routine cleanup of the Steam Store navigation", which was "removed from the main navigation bar based on user traffic".

Because this move sparked a large number of people to speculate on the future of Steam Machines, Valve decided to set the record straight. As the post acknowledges, "While it's true Steam Machines aren't exactly flying off the shelves, our reasons for striving towards a competitive and open gaming platform haven't significantly changed."

This means that Valve's commitment to Linux remains

intact. Many gamers and developers aren't too happy with the dominance of the Windows operating system for gaming PCs. Microsoft's push to make its own Microsoft Store, a rival to Valve's Steam store, an integral part of Windows 10 could be seen as a major reason why Valve wants to set up an alternative operating system.

Source:

<https://www.techradar.com/news/valve-insists-theres-still-life-in-steam-machines-and-linux-gaming>

## MIT RESEARCHERS CREATE 'ALTEREGO' HEADSET THAT INTERPRETS USER'S THOUGHTS

Many of us, at some point, have wished for a gadget that could perform tasks without so much as lifting a finger to type or even speaking. Our wish might just come true because researchers from MIT have built a computer interface that can read your thoughts.

They have developed a headset

named AlterEgo that can interpret words that are spoken out loud in mind without actually speaking. This invention outdoes virtual assistants like Siri or Alexa that require voice commands to trigger a response.

AlterEgo is a wearable headset that wraps around the user's ear and jaw, and the computing system integrated in the device processes the data picked up by its sensors.

When we speak in mind, neuromuscular signals are generated in our jaw and face. These signals are fed to the machine-learning system of AlterEgo which can later correlate particular signals with particular words.

The idea was to develop a computing platform that "melds human and machine" in a certain way and acts as "an internal extension of our own cognition," said Arnav Kapur, the lead researcher on this project.

Source:

<https://fossbytes.com/mit-researchers-alterego-headset-silent-speech/>

## SLIMBOOK CURVE: ENJOY USING LINUX ON THIS 24" CURVED SCREEN ALL-IN-ONE POWERHOUSE

Slimbook has added another machine to their PC lineup which lets people experience Linux on quality machines. Their latest offering is an All-In-One desktop computer called Slimbook Curve.

As the name suggests, it lets you use your favorite Linux distro on a 24-inch FHD curved screen display that is enclosed in a beautiful aluminum body. Slimbook Curve comes with all the features and enough power a regular user would want from their PC.

Users can pick between an Intel Core i7-7500 and Core i5-7200 CPUs, add up to 16 gigs of DDR4 RAM, and up to 1TB of SSD storage. A secondary storage can be added as well. It also includes built-in speakers, Bluetooth 4, 6 USB ports, and a WiFi-AC chip onboard.

An Intel HD 620 chip handles the graphics department. The

absence of a discrete GPU could be a turn down for many. It somewhat digestible as dedicated graphics chips aren't a common sight on AIOs. Another drawback could be its 7th generation Intel chip, but given the compatibility needs of Linux operating systems, again this could be acceptable.

Source:

<https://fossbytes.com/kde-slimbook-curve-aio-24-inch-curved-screen/>

## UPDATE FOR UBUNTU 16.04 LTS PATCHES SECURITY VULNERABILITIES

Canonical has released a kernel update for Ubuntu 16.04 LTS. The "important update" patches 39 security vulnerabilities, according to a report by Softpedia.

The update covers Ubuntu 16.04 LTS and its official derivatives, including Kubuntu, Lubuntu, and Xubuntu.

Security fixes contained in the update cover a wide range of issues, such as vulnerabilities in the Linux kernel's USB over IP

implementation – which allowed remote attacks.

The kernel update is available for 64-bit and 32-bit Linux kernel packages of Ubuntu 16.04 LTS using the Linux 4.4 kernel, along with Raspberry Pi 2 and Amazon Web Services systems.

Source:

<https://mybroadband.co.za/news/security/255213-update-for-ubuntu-16-04-lts-patches-security-vulnerabilities.html>

## SHOULD UBUNTU LINUX REPLACE ALPHA/BETA RELEASE MODEL WITH "TESTING WEEKS"?

One of the biggest advantages of open source technology projects is that everybody from the community is free to float an idea and if it gains community support, it could be turned into reality. Along the similar lines, well-known Ubuntu developer Simon Quigley has suggested an idea that might change the Ubuntu Linux development process.

In an Ubuntu mailing list post, he has proposed to get rid of Alpha and Beta 1 milestones entirely.

But, why has he made this proposal? Well, a couple of recent developments made him question the usefulness of the current milestone model. First was the cancellation of alpha releases and then missing of Lubuntu Beta 1 due to some bugs.

He also said that while Alpha 1 images are time bound and shipped as "safe to install" for testing. But that's not the case; most of the time, due to a given timeline, these releases are shipped with bugs which could have been fixed with some effort.

Instead of the current model, he proposed a monthly "testing week" that would go from Tuesday to Thursday. It won't involve existing milestones like archive freeze or formally released ISOs. Throughout the week, the users would be able to download bleeding edge ISOs.

As per Quigley, he has discussed the proposal with developers of Xubuntu, Ubuntu MATE, Kubuntu, and Ubuntu

Budgie.

Source:

<https://fossbytes.com/ubuntu-linux-replace-alpha-beta-release-model-test-weeks/>

## RED HAT ENTERPRISE LINUX 7.5 OFFICIALLY RELEASED, ENHANCES HYBRID CLOUD SECURITY

The fifth maintenance update of Red Hat's enterprise-ready Linux-based operating system, Red Hat Enterprise Linux 7.5 is here to add yet another layer of performance and security enhancements to existing installations, as well as a plethora of new features with new deployments, which would mostly benefit enterprise customers on the desktop, server, and cloud infrastructures.

Fully patched against the Meltdown and Spectre security vulnerabilities, Red Hat Enterprise Linux 7.5 integrates the Red Hat Ansible Automation tool with OpenSCAP, a collection of Open Source utilities for implementing

and enforcing the Security Content Automation Protocol (SCAP) standard, and provides further integration with Microsoft's Windows infrastructure in Microsoft Azure and on-premise.

Red Hat Enterprise Linux 7.5 also adds support for more securely unlock of Network Bound Disk Encrypted devices during boot up, process, implements a virtual data optimizer (VDO) technology designed to reduce data redundancy through inline deduplication and compression, leading to massive cost reductions for active storage and storing of monthly snapshots, and brings a much simplified management web-based interface for IT admins.

Source:  
<http://news.softpedia.com/news/red-hat-enterprise-linux-7-5-officially-released-enhances-hybrid-cloud-security-520611.shtml>

## DISAPPEARING DATA UNDER ZFS ON LINUX SPARKS SMALL, SWIFT UPGRADE

Maintainers of ZFS on Linux have hustled out a new version after the previous release created the impression of data loss.

ZFS on Linux 0.7.7 only landed on March 21st, but as this GitHub thread titled "Unlistable and disappearing files", users experienced "Data loss when copying a directory with large-ish number of files."

The bug meant that attempts copies produced errors that claimed the filesystem was full and resulted in files just not arriving at their intended destinations.

Users verified the problem under a few Linuxes and quickly debated whether to roll back or wait for relief.

The new version was created with impressive speed: the thread reporting the bug was started on April 7th 2018 and the fix landed three days later. So even though three reviewers signed off on the cruddy commit, the speedy response may mean it's possible to consider this a triumph of sorts for open source.

Source:

[https://www.theregister.co.uk/2018/04/10/zfs\\_on\\_linux\\_data\\_loss\\_fixed/](https://www.theregister.co.uk/2018/04/10/zfs_on_linux_data_loss_fixed/)

## KDE CONNECT RECEIVES NAUTILUS CONNECTION

For quite some time, several developers working around the KDE project have been working on a new system that will unify notifications from Android smartphones and the plasma desktop. KDE Connect is to bring some notifications and other features of the smartphone to the KDE desktop. These include, among other things, the display of incoming calls and short messages, notifications or an alarm of an app and the battery status. But also the reverse way is possible. For example, plasma messages can be displayed on a smartphone, which can exchange clipboard contents or even files between the various devices. In addition, the phone can be used as a remote control for multimedia applications under Linux.

With the now announced

version 1.3, the team has opened the interface further towards Gnome and KDE Connect donated a connection to Nautilus. Among other things, the extension extends the file manager with a menu that allows the transmission of files. Also new in the current version is the handling of »tel:< links and the support of album output via MPRIS. Furthermore, wildcards can now be used to distribute files, and notifications no longer cause the extension to crash.

Source: <http://www.pro-linux.de/news/1/25784/kde-connect-erh%C3%83%C2%A4lt-nautilus-anbindung.html>

## GAME MODE: BOOST YOUR LINUX GAMING PERFORMANCE WITH THIS OPEN SOURCE TOOL

If you use Linux or macOS and you're into gaming, the chances are that you might have heard about Feral Interactive. They're known to develop and port games from their partners to other platforms, including Tomb Raider,

Batman: Arkham, etc.

To make sure that you can utilize your Linux machine's horsepower to the fullest, Feral has released a new open source tool named GameMode. As the name suggests, this tool tells the CPU to run in Performance Mode whenever a game is being played.

Once you're done with your gaming session, Feral automatically brings down the performance level to the normal.

"GameMode is a daemon/lib combo for Linux that allows games to request a set of optimizations be temporarily applied to the host OS," the GitHub page of tool describes.

The first gaming title to integrate GameMode optimization is Rise of the Tomb Raider, which is a new action-adventure title coming to Linux.

GameMode developers have recommended the users to grab the tool directly from your distro repositories. At the moment, AUR and Solus packages have been made available.

Source:

<https://fossbytes.com/gamemode-boost-linux-gaming-performance-open-source-tool/>

## SYSTEM76 BECOMES GNOME FOUNDATION ADVISORY BOARD MEMBER

System76 has long been a huge champion of both Linux and open source. If you aren't familiar, the company sells premium computers running the Ubuntu operating system. Recently, the company decided to create its own Ubuntu-based distro called "Pop!\_OS" which uses the GNOME desktop environment.

Today, Denver, Colorado-based System76 takes its commitment to GNOME even further by becoming a Foundation Advisory Board member. It joins other respected companies on the board such as Google, Red Hat, and Canonical to name a few.

Louisa Bisio, Marketing Director, System76 explains, "Less than a year ago, we launched Pop!\_OS, and the community that's grown up around it has been fantastic and

continues to evolve. We're excited to join the GNOME Foundation Advisory board and continue our engagement with the wider free software community."

System76 joining the GNOME Foundation Advisory Board is very appropriate, as the company doesn't just use GNOME for its operating system, but it contributes back to the desktop environment too. In other words, System76 has positive influence over the future of GNOME, and its joining the board should prove quite beneficial.

Source:

<https://betanews.com/2018/04/11/system76-gnome-foundation-advisory-board/>

## GOOGLE FUCHSIA IS NOT LINUX: SO, WHAT IS IT AND WHO WILL USE IT?

Fuchsia, Google tells us in some recently revealed documentation, is not Linux. So, what is it then? And what's it good for?

Google has been working on

this open-source operating system since the summer of 2016. At first, we thought Fuchsia was for Internet of Things (IoT) devices. We now know it can also power Chromebooks and smartphones.

Is it a replacement for Android and Chrome OS? Good question. It's not clear what Google plans for it. We do know it runs on Google's high-end, Chrome-OS powered Pixelbook. You can also install it on Acer Switch 12 and Intel NUC and, eventually, on a Raspberry Pi 3.

Fuchsia developer Travis Geiselbrecht said in a Fuchsia IRC discussion that Fuchsia isn't "a toy thing." He added that it's not a 20-percent project -- and "it's not a dumping ground of a dead thing that we don't care about anymore." A 20-percent project is when Google developers work on something because it interests them rather than because it's part of their job. The most popular theory is to "replace Android and Chrome OS." No. Just no.

Both operating systems are popular with users and developers. Android is the world's most popular operating system. Besides, if you're a programmer, would you



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**Survey URL:**  
<http://bit.ly/fcm2018>

want to move literally over a million Android apps to a new platform? I don't think so!

I suspect Fuchsia will find its home in virtual reality, augmented reality, or other "still to come" technologies. It's not a replacement for what we already have; it's a door to a future we're not living in yet.

Source:

<https://www.zdnet.com/article/google-fuchsia-is-not-linux-so-what-is-it-and-who-will-use-it/>

## UBUNTU 18.04 LTS INTEGRATES CANONICAL LIVEPATCH FOR REBOOTLESS KERNEL UPDATES

**C**anonical Livepatch is a free and commercial solution for applying Linux kernel updates without rebooting your Ubuntu computer. Initially designed for the Ubuntu 16.04 LTS (Xenial Xerus) operating system series, Canonical's kernel livepatch service is coming in an easier-to-use form in Ubuntu 18.04 LTS, due for

release on April 26.

The Software & Updates utility found in the default Ubuntu installation now integrates the Canonical Livepatch service in the Updates tab, but, to use it, you'll have to create an Ubuntu SSO (Single Sign-On) account and login with it by clicking on the "Sign In" button (see the screenshot gallery below for details).

Promising to increase the security of your Ubuntu Linux computer between restarts, the Canonical Livepatch provides a more convenient method for installing kernel patches, which Canonical releases on a regular basis for all of its supported Ubuntu releases. However, its functionality is limited to only three machines.

If you need to use Canonical Livepatch on more than three computers, you'll have to purchase an Ubuntu Advantage subscription. As expected, the Canonical Livepatch service uses Canonical's Snappy technologies to apply kernel security patches without restarts via Snap packages.

Source:

<http://news.softpedia.com/news/ubuntu-18-04-lts-integrates-canonical-livepatch-for-rebootless-kernel-updates-520680.shtml>

## MICROSOFT CREATES ITS OWN VERSION OF LINUX FOR THE FIRST TIME, LAUNCHES AZURE SPHERE OS

With the onslaught of Internet of Things devices, ensuring its security has become a major concern among the makers. In a bid to safeguard IoT products, Microsoft has introduced Azure Sphere, a technology that will revamp the security of microprocessors that powers the smart appliances and gadgets we use.

Azure Sphere is a package of products which includes a new design for chips that could be integrated with smart devices. And the most interesting part is Microsoft, which once called Linux a "cancer," has used the open-source operating system to create this technology.



However, Microsoft's love for Linux has increased in the recent years. A proof which has been the addition of robust support for Linux in its Azure cloud platform, which allows developers to integrate Linux with Windows 10. Microsoft has adopted a combined approach through Azure Sphere which uses hardware, software and the cloud to secure internet-connected devices.

Source:

<https://fossbytes.com/microsoft-introduces-azure-sphere-customized-linux-kernel/>

## LINUS TORVALDS KICKS OFF LINUX 4.17 DEVELOPMENT, TEASES THE LINUX 5.0 RELEASE

**A**t the end of every Linux kernel development cycle, the merge window opens for the next release, in this case, Linux 4.17. Now, two weeks later, the merge window is closed, and public testers can start downloading, compiling, and installing the upcoming Linux 4.17 kernel on

their favorite GNU/Linux distributions.

As this is a development version, it's not recommended for deployment in production machines. Linux kernel 4.17 doesn't look to be a big release, and it won't include any major new features, according to Linus Torvalds, which teased the Linux community with the future release of the Linux 5.0 kernel series.

While the Linux 5.0 kernel release would happen someday, we're talking a closer look at Linux kernel 4.17 series in this article, as the first Release Candidate (RC) milestone removes support for a bunch of hardware architectures, including M32R, Metag, FR-V, Blackfin, CRIS, MN10300, TILE, and S+core.

On the other hand, it adds support for a new architecture, namely NDS32, a 32-bit RISC architecture developed by Andes Technology. In numbers, the Linux 4.17 kernel series changes a total of 13538 files, with 627723 insertions and 818855 deletions.

Source:

<http://news.softpedia.com/news/linux-torvalds-kicks-off-linux-4-17-development-teases-the-linux-5-0-release-520712.shtml>

python3 or a soft link that enables the user simply to type python.

When users install Python packages, they go into two folders, depending on whether they use the package manager pip2 or pip3.

Put the wrong version of Python into the wrong folder on the Linux box, and you can end up with an unrecoverable situation .

An admin might drill down and try to install the Depends on packages in an attempt to fix the situation, but that can create a further mess (see Figure 2). Admins typically fix broken dependencies via sudo apt-get install -f, but this method is usually ineffective with Python and Linux.

To resolve Python and Linux problems, install the virtualenv Python environment isolation tool. Virtualenv creates multiple Python environments for multiple users. It works by installing Python 2 and Python 3 binaries in the target folder, which is preferably the user's home folder. Then, it installs Python packages in (target folder)/lib. It also can share system wide packages.

Source:

<https://searchitoperations.techtarget.com/tutorial/Resolve-issues-between-Python-and-Linux-with-virtualenv>

## FEDERAL ADMINISTRATION RELIES ON NEXTCLOUD

In order to save and exchange documents, the German federal administration will use Nextcloud in the future. The open-source cloud should run on its own server infrastructure, project staff do the support.

Around 300,000 users are members of the federal administration, which has been looking for a file-sharing and sync solution in a call for tenders via its IT service provider ITZ Bund (Federal Information Technology Center). It is all about the fact that the employees quickly and easily exchange documents and keep, but also work together on these.

The contract was awarded Nextcloud. The ITZ Bund has been running the cloud solution since October 2016 with about 5,000 users in the test. Thanks to a

Nextcloud Enterprise subscription, the Nextcloud project will also provide support for the cloud in the future. It was important to the federal administration that the cloud solution can be hosted on its own servers, which the IT service provider controls. The "federal cloud", as Nextcloud calls it in its announcement, is also compliant with the General Data Protection Regulation (DSGVO), which comes into force on 1 May 2018.

Another crucial point for the selection was the security. After the Bundestag hack the authorities are particularly worried about potential security gaps. The Nextcloud code is certified by Open Chain, a Linux Foundation project that verifies the compliance of open source software. There is also a bug bounty program.

Source: <http://www.linux-magazin.de/news/bundesverwaltung-setzt-auf-nextcloud/>

## LINUX KERNEL 4.15 REACHED END OF LIFE, USERS URGED TO MOVE TO LINUX 4.16 Now

After a very busy cycle due to the Meltdown and Spectre security vulnerabilities, which were publicly disclosed earlier this year and later discovered to put billions of devices using modern processors at risk of attacks, the Linux 4.15 kernel series was released at the end of January heavily redesign against two critical hardware bugs.

Now, nearly three months and only eighteen maintenance updates later, the Linux 4.15 kernel series reached end of life and it will no longer receive support. As such, all those using a kernel from the Linux 4.15 branch on their GNU/Linux distributions are urged to upgrade to the latest Linux 4.16 kernel series as soon as possible.

While the Linux 4.15 kernel series included Spectre and Meltdown mitigations for the 64-bit and 32-bit hardware architectures, the recently released Linux kernel 4.16 branch

appears to be fully patched against those nasty vulnerabilities, bringing support for 64-bit ARM (AArch64) and IBM System z (s390) hardware.

Besides that, Linux kernel 4.16 comes with numerous updated and new drivers to support the latest hardware components and devices, so those with modern computers must upgrade to it immediately.

Source:

<http://news.softpedia.com/news/linux-kernel-4-15-reached-end-of-life-users-urged-to-move-to-linux-4-16-now-520787.shtml>

## UBUNTU LINUX REPLACES ALPHA/BETA RELEASE MODEL WITH "TESTING WEEKS"

One of the biggest advantages of open source technology projects is that everybody from the community is free to float an idea and if it gains community support, it could be turned into reality. Along the similar lines, well-known Ubuntu developer Simon Quigley has suggested an idea that might



change the Ubuntu Linux development process.

In an Ubuntu mailing list post, he has proposed to get rid of Alpha and Beta 1 milestones entirely. But, why has he made this proposal? Well, a couple of recent developments made him question the usefulness of the current milestone model. First was the cancellation of alpha releases and then missing of Lubuntu Beta 1 due to some bugs.

He also said that while Alpha 1 images are time bound and shipped as “safe to install” for testing. But that’s not the case; most of the time, due to a given timeline, these releases are shipped with bugs which could have been fixed with some effort.

Instead of the current model, he proposed a monthly “testing week” that would go from Tuesday to Thursday. It won’t involve existing milestones like archive freeze or formally released ISOs. Throughout the week, the users would be able to download bleeding edge ISOs. As per Quigley, he has discussed the proposal with developers of Xubuntu, Ubuntu MATE, Kubuntu,

and Ubuntu Budgie. Simon Quigley’s proposal to drop Alpha and Beta milestones hasn’t received any downvotes. As a result, the Ubuntu 18.10 release cycle will feature testing weeks and Alpha and Beta milestones will be dropped.

Source:

<https://fossbytes.com/ubuntu-linux-replace-alpha-beta-release-model-test-weeks/>

## CHROME OS TERMINAL APP HINTS AT UPCOMING LINUX SUPPORT

Who needs a combined Android and Chrome OS when Chrome OS can pretty much run it all. There’s native Chrome OS, of course, and official Android support via Google Play Store. There’s even preliminary Windows support via WINE for Android on Chrome OS. And, soon, Chromebooks might be able to run Linux programs as well. That possibility already was hinted at last February but might be coming really soon with the appearance of the Terminal app in Chrome OS’ dev channel.

It almost feels ironic that Linux support is still coming to the Linux-based Chrome OS. But like with Android, which also uses the Linux kernel, Google has modified it so much that there is very little semblance to Linux. Coming full circle, Chrome OS could soon run Linux software somewhat directly, opening the OS and Chromebooks to use cases beyond education or enterprise.

Spotted and confirmed by some Redditors, the Terminal app advertises the ability to run “your favorite native apps and command line tools” while warning that a 200 MB download is required to install it. For now, however, clicking on Install only ends in failure. The fact that there is already a Terminal app ready to be installed does imply that the feature is close to being available, at least for alpha and beta testing.

Source:

<https://www.slashgear.com/chrome-os-terminal-app-hints-at-upcoming-linux-support-23528192/>

## LINUX DEVELOPERS: KERNEL COMMUNITY WILL COLLAPSE UNDER ITS OWN BUREAUCRACY

Maintainers of the Linux kernel will not be able to comply in a few years to process submitted patches. The system faces collapse if they fail to distribute the workload, claims kernel developer Daniel Vetter.

Anyone can join the Linux kernel, but only a group of privileged developers are allowed to touch the actual source code. These so-called maintainers should ensure that patches and new functions that end up in the kernel, the usual quality. However, the system does not work as well as it often advertises, says kernel developer Daniel Vetter. He points out that maintainers are adopting less and less of their own code and instead, in his view, becoming a bureaucratic bottleneck. In addition, he wants to have observed that the patches of the maintainer are not as closely examined as those of the normal developers.



Vetter, himself maintainer of the Intel i915 graphics driver in the Linux kernel, has analyzed pull requests in the kernel to get his insights. As he admits, this allows only a glimpse of the subsystem level of the kernel with its various maintainers, not individual patches. However, he is mainly interested in exactly this subsystem level and he strongly advertises how he and his colleagues in the graphics subsystem have improved the maintainer situation. He recommends that other maintainers tackle kernel-scale growth, train junior maintainers, and spread the work over more shoulders.

Source:

<https://www.heise.de/newsticker/meldung/Linux-Entwickler-Kernel-Community-wird-unter-eigener-Buerokratie-zusammenbrechen-4030460.html>

## LIBREM 5 LINUX SMARTPHONE WILL SUPPORT UBUNTU TOUCH, PUREOS, OR PUREOS WITH KDE PLASMA MOBILE

After raising more than \$2 million last year to build a Linux-powered smartphone with a focus on privacy and open source software, Purism hopes to deliver the first Librem 5 smartphones early next year.

One of the biggest challenges is software: the phone won't ship with Android or iOS. Instead, it will run free and open source Linux-based software, which doesn't have a great track record with being phone friendly. But now Purism has announced that the Librem 5 will support at least three different operating systems and user interfaces at launch: PureOS, a version of PureOS with the KDE Plasma Mobile environment, and Ubuntu Touch.

PureOS is the company's own Linux distribution, which the team is adapting to work on touchscreen devices with phone-sized screens. KDE Plasma Mobile is a mobile

project from the team behind the KDE desktop environment for GNU/Linux. And Ubuntu Touch... is the version of Ubuntu Linux that Canonical developed for phones and tablets, and then scrapped when the company decided to shift direction.

But Ubuntu Touch is an open source project, so when Canonical stopped developing it, another team of developers calling themselves UBports decided to pick up the torch, continuing to work on the operating system, making it available for users to download and install on a handful of devices, including the Google Nexus 5, Fairphone 2, OnePlus One, and MQ Aquaris M10 tablet.

Now you can add the Librem 5 to that list... or at least you'll be able to when the phone ships.

UBports and Purism are working together to ensure that Ubuntu Touch is fully supported on the phone and that future software updates remain compatible.

Source:  
<https://liliputing.com/2018/04/librem-5-linux-smartphone-will-support-ubuntu-touch-pureos-or-pureos-with-kde-plasma-mobile.html>

## ONNX: THE OPEN NEURAL NETWORK EXCHANGE FORMAT

An open-source battle is being waged for the soul of artificial intelligence. It is being fought by industry titans, universities and communities of machine-learning researchers world-wide. This article chronicles one small skirmish in that fight: a standardized file format for neural networks. At stake is the open exchange of data among a multitude of tools instead of competing monolithic frameworks.

The good news is that the battleground is Free and Open. None of the big players are pushing closed-source solutions. Whether it is Keras and Tensorflow backed by Google, MXNet by Apache endorsed by Amazon, or Caffe2 or PyTorch supported by Facebook, all solutions are open-

source software.

Unfortunately, while these projects are open, they are not interoperable. Each framework constitutes a complete stack that until recently could not interface in any way with any other framework. A new industry-backed standard, the Open Neural Network Exchange format, could change that.

Now, imagine a world where you can train a neural network in Keras, run the trained model through the NNVM optimizing compiler and deploy it to production on MXNet. And imagine that is just one of countless combinations of interoperable deep learning tools, including visualizations, performance profilers and optimizers. Researchers and DevOps no longer need to compromise on a single toolchain that provides a mediocre modeling environment and so-so deployment performance.

What is required is a standardized format that can express any machine-learning model and store trained parameters and weights, readable

and writable by a suite of independently developed software.

Enter the Open Neural Network Exchange Format (ONNX).

Source:

<https://www.linuxjournal.com/content/onnx-open-neural-network-exchange-format>

## UBUNTU 18.04 LTS (BIONIC BEAVER) IS NOW AVAILABLE TO DOWNLOAD

The wait is finally over, and you can now download Ubuntu 18.04 LTS (Bionic Beaver) if you want to install it on your personal computer (see download links below). This is Canonical's seventh LTS (Long Term Support) Ubuntu release, supported until April 2023 with security and software updates.

Ubuntu 18.04 LTS is only available for 64-bit PCs on the Desktop, but it supports the 64-bit (amd64), ARM64 (AArch64), IBM System z (s390x), PPC64el (Power PC 64-bit Little Endian), and Raspberry Pi 2/ARMhf

architectures on the Server.

All official derivatives, including Kubuntu, Xubuntu, Lubuntu, Ubuntu Studio, Ubuntu MATE, Ubuntu Kylin, and Ubuntu Budgie, support both 32-bit and 64-bit hardware architectures. Ubuntu 18.04 LTS is powered by the Linux 4.15 kernel, which reached end of life.

Without any further ado, you can download Ubuntu Desktop 18.04 LTS, Ubuntu Server 18.04 LTS, Kubuntu 18.04 LTS, Xubuntu 18.04 LTS, Lubuntu 18.04 LTS, Ubuntu MATE 18.04 LTS, Ubuntu Kylin 18.04 LTS, Ubuntu Studio 18.04 LTS, and Ubuntu Budgie 18.04 LTS.

Source:

<https://news.softpedia.com/news/ubuntu-18-04-lts-bionic-beaver-is-now-available-to-download-520855.shtml>



## FULL CIRCLE 2018 SURVEY

**It's that time of the year again where we ask what you think of FCM, Ubuntu, and Linux.**

Some questions are a requirement, some you can skip over if not applicable.

Your answers will help shape Full Circle, so please use your constructive criticism. If you don't tell us what you think, or what we're doing wrong, then we won't know.

**Survey URL:**  
<http://bit.ly/fcm2018>



# COMMAND & CONQUER

Written by Lucas Westermann

I've frequently written articles on tools and websites that I find useful in my work life. However, it has been a long time since I focused on CLI tools. As such, I thought it would be good to revisit this topic and share an up-to-date list of commands that I find myself using almost every day.

## DIG

Dig is a tool which lets you pull in DNS information about a particular domain. This is extremely helpful when you're migrating websites (to see if the error is an error or the DNS not having updated yet), and is also a troubleshooting step I like to use when I have no internet access, as occasionally the issue is with the DNS and not the actual connection.

`dig @8.8.8.8 google.com`

The @ indicates what DNS server it should use - omitting this will use your default DNS.

## TIME

If you're a programmer or just someone who uses the CLI a lot, you may occasionally notice a command taking a long time to complete. When this happens to me, I like to run it through time to get a value for the duration of the command, and tweak settings as I compare the numbers.

`time <command>`

Replace "<command>" with the actual command you want to run. It will return 3 values - real, user, and sys. You are typically interested in the "real" value.

## PING

Most likely, everyone already knows this command - but if you're looking for a domain's IP, or just checking whether or not something responds, this is a tool I use every day. If Ping indicates to me that one domain isn't responding while another is, then I'll move onto something like downforeveryoneorjustme.com

`ping www.google.com`

## LYNX

Lynx is a CLI-based browser. While this isn't a tool I use too frequently, it can be useful if you want a text-based display of a site (eg, a tutorial), or if your X Server won't start and you need to google something without the aid of another device.

## TMUX

A few months ago, I switched from two monitors to a single ultra wide display. Previously I'd dedicate a single monitor to my terminal, but nowadays I have to split my display in order to have a comfortable size browser and terminal. While I can use i3 to vertically/horizontally split my windows, I sometimes want to have what is essentially a "tabbed" terminal - full height, about 33% of the width, and yet have multiple terminals running. This is where tmux comes in - I start a session, run a command, and then create a

# Useful CLI Commands

second one I can switch between. This also has the added benefit of securing my sessions against accidental closure - while I was getting used to having only one display, I'd occasionally close the wrong window. With tmux I simply need to attach to the session from a new terminal window. It's also a great way to run a process in the background while giving yourself the option of connecting to it later (see example below).

`tmux -d -s "Session Name" <command>`

The example creates a detached (hidden) session using the given command and session name. If you then want to check the output for errors (for example), you simply need to run the tmux attach command (and indicate the ID of the detached session).

## GREP OR FIND

Very often, I'll have some configuration files, or small text files with notes or fixes I've hastily

typed up. When looking for the correct files, I almost always use grep (or find). Grep is used to check the contents of a file, while find can be used to search for files by name, type, etc. You can also combine the two commands by executing a grep search on all results returned by find (see example below).

```
find . -name "*.py" -exec  
grep -H "searchterm" {} \;
```

The above command searches all python files in the local directory and subfolders for the word "searchterm". The -H flag tells grep to list the file name, so you can actually know what file it is you're looking for. You can adjust any of the parameters as necessary.

## KILLALL

Also a command that most people probably know. It takes the name of an application, and kills all instances of it. Very useful if something isn't responding, or there is no official way to stop it.

<COMMAND1> &&  
<COMMAND2>

Not really a command, but a feature of the Linux Shell that I use all the time. It essentially says "if command1 completes successfully, run command2". I use this a lot when developing, since I sometimes have a build process that happens in two steps. This is also related to "||", which runs the second command only if the first one fails (logical or). Also related to ";" which just means "run command 2 after command1".

## MKDIR -P

This is simply an additional argument to mkdir, which creates any folders along the path if they don't exist. So, if you tell it to create ~/test-documents/university, but test-documents doesn't exist, the command will fail with a "no such file or directory". But, with -p, it will just create the missing folders. Very useful when combined with the next (and final) tip.

## {ITEM1,ITEM2,ITEM3}

This is a convention that Bash and most other shells allow. It is essentially a list of options that

cycles through one by one. Combining it with the mkdir command from above, something like this is possible:

```
mkdir -p  
~/taxes/{2017,2018}/{receipts,  
forms}
```

The command would create the folders 2017 and 2018 in the folder taxes. Each year would also contain the folders "receipts" and "forms". The key thing here is to avoid using spaces around the commas. If you're using spaces in the items, be sure to escape them or to enclose the items in quotes.

I hope this list introduces you to a few new commands or shell tricks. If you know of a tool or a trick that I haven't covered that you can't live without, feel free to let me know about it via email. As always, I can be reached at [lwest34+fcm@gmail.com](mailto:lwest34+fcm@gmail.com).

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**Lucas** has learned all he knows from repeatedly breaking his system, then having no other option but to discover how to fix it. You can email Lucas at: [lwest34@gmail.com](mailto:lwest34@gmail.com).

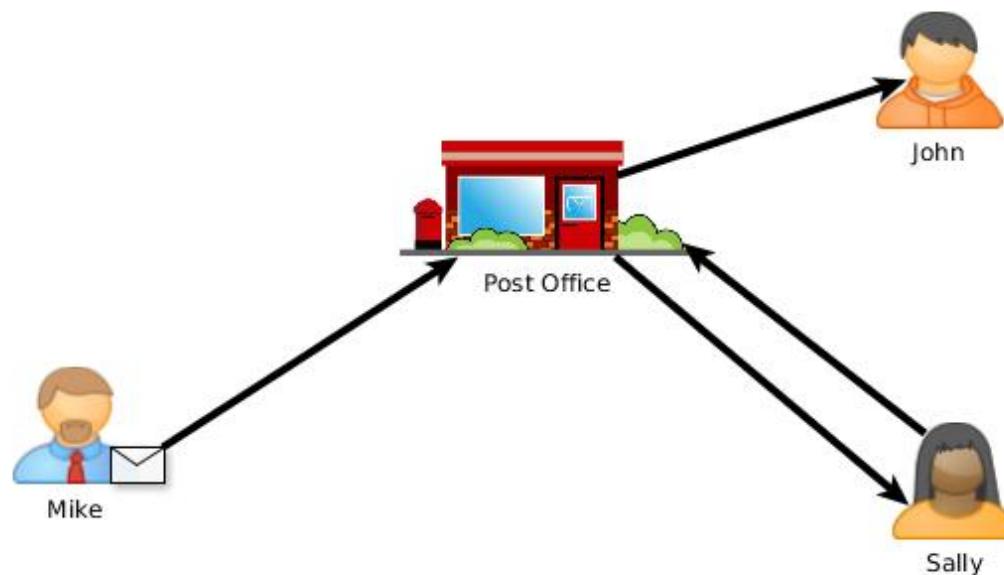




Hi everyone. It's been quite a while since I've been able to do much in the way of writing, but things are slowly getting better, so I've decided to start again with a discussion of MQTT.

MQTT is a lightweight, easy to use, network protocol to send data from one computer or application to another. It works in a client/server model, using a broker, publishers and subscribers.

So what does that mean?



One of the best examples I found that helps to break it all down, was to compare it to a post office (<https://www.baldengineer.com/mqtt-introduction.html>).

The post office (broker or server) exists to route letters and packages (messages) from people and companies (publishers) to other people and companies (subscribers). If you want to send a message to someone, you create the message and send it to someone else through the post

# Python In The REAL World - Pt.82

office. The post office receives your message and routes it to the recipient. However, the recipient needs to be known to the post office for them to be able to deliver it to them.

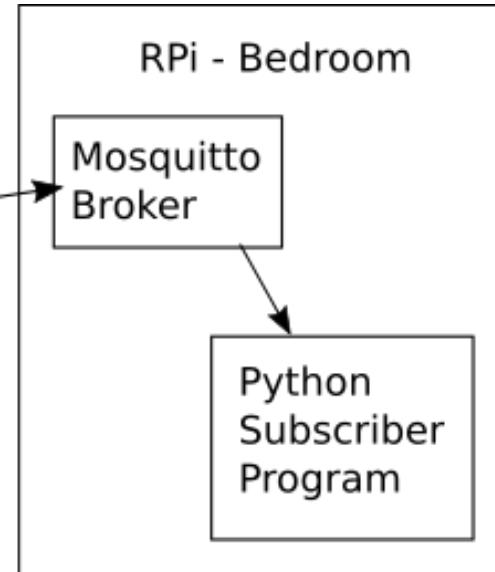
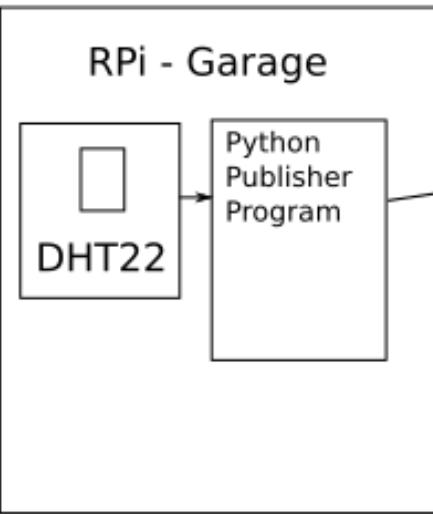
In the above example, Mike wants to send a message to Sally. Mike (the publisher) sends the message to the post office and they know Sally's address, so they send it to her (subscriber). Sally can also send messages (not only a subscriber, but a publisher as well), through the post office, to John (another subscriber).

In the real world, we have an application, acting as a publisher, that sends messages, based on a topic, to the broker. The broker then sends the message along to any other program, on any other machine or the same machine, that has subscribed to that message topic.

I have been asked, what happens if one of the clients that are subscribed to a topic goes away for some reason. There are

three Quality of Service (QoS) levels that can be set for any message being sent to the broker. When a client normally connects to the broker, it is in a non-persistent manner and the QoS level is set to 0, so any messages that arrive when a subscribing client is not connected are lost. If it is important that the subscribers get all messages, the publishing client must set up a persistent session and send the messages with a Quality of Service level higher than 0. We'll deal with QoS and persistent sessions next month when we create our publishing client.

Let's assume that we have a Raspberry Pi 3 that sits in our garage that reads a DHT11 or DHT22 Humidity and Temperature sensor. Let's further assume that we have another Raspberry Pi 3 that we want to use to monitor that information in our bedroom. We can set up a MQTT broker on our bedroom RPi to receive the messages by using Mosquitto available in the software manager.



The RPi in the garage can use a modified version of the software that we used way back in Full Circle Magazine #109 to monitor the sensor and publish the messages to the Mosquitto broker in the bedroom. On the RPi in the bedroom, we will write a simple Python program to subscribe to those messages. But first, let's look deeply into MQTT under Python.

For testing purposes, we'll run the sensor, publishing program, broker and subscriber program all on the same Raspberry Pi.

The first thing we need to do is install Mosquitto and its two

clients. From the Main Menu, go to Preferences | Add / Remove Software. In the search box, type 'mosquitto'. You are looking for two packages. The first is the broker. It shows up as 'MQTT version 3.1 / 3.1.1 compatible message broker mosquito-1.4.15-0mosquitto1'. Select it, then, a few lines down from that, you want to find 'Mosquitto command line MQTT clients mosquito-clients-1.4.15-0mosquitto1'. Select this as well, then click the 'Apply' button. Once these are installed, you can dismiss the Software manager. Alternately, you can use apt-get to install it. In a terminal window, type

```
sudo apt-get install mosquitto mosquitto-clients
```

and they will be installed for you.

Once you have these programs installed, reboot the RPi and mosquitto will automatically be started. You won't see anything, but it is running. Now we'll make sure things are working correctly.

Open two terminal windows. Put one on the left side of the screen and the other on the right side. In the left window type

```
mosquitto_pub -h localhost -t test -m 'Hi There'
```

When you press <enter>, nothing appears to happen, but you've created your first MQTT subscription. Let's press pause for a second and see what we did.

The first part of the line we just typed was (of course) the command to run 'mosquitto\_sub', the command line subscription client for MQTT. The '-h localhost' tells the client that the broker, or host, is running on our local host. The '-t test' tells the client that it should subscribe to the topic named 'test'. More on that in a

minute. The reason that nothing happened when you pressed <enter> is that it's waiting for a message to be published on the 'test' topic. So, let's move over to the right terminal window and type

```
mosquitto_pub -h localhost -t test -m 'Hi There'
```

Now look at the left terminal. You should see 'Hi There' echoed in the terminal.

The 'mosquitto\_pub' is the command-line publishing client. It runs one command at a time, so, everytime you want to publish a message, you have to enter the entire command into the terminal. Just like the command-line for the subscription client, the '-h localhost -t test' portion of the command says to attach to the broker and subscribe to the 'test' topic. The final part of the command is the message itself, which is, of course, the '-m "Hi There"' portion.

While this seems very simple on the face of it, there is a lot going on here.

The mosquitto broker (server) is

running on our RPi and sits there by default listening on TCP/IP port 1883. You can change the port number to most any available TCP/IP port, however port 1883 is registered with IANA specifically for MQTT. TCP/IP port 8883 is also registered, for using MQTT over SSL. If you don't want to run your own broker, there are many public brokers you can use, some of them are free. You can find a list of some of these and their conditions for use at

[https://github.com/mqtt/mqtt.github.io/wiki/public\\_brokers](https://github.com/mqtt/mqtt.github.io/wiki/public_brokers).

When a program wants to publish to a broker, it first needs to connect, then sends the topic and the message. It doesn't have to be concerned who's there, if anyone. A subscribing program also doesn't have to care about much, other than subscribing to the proper topic that is being published on the broker. The key here is that if you accidentally subscribe to the wrong topic, nothing will ever come in. When we set up our two terminal window test above, we started the subscriber client before the first message ever came in. The broker didn't know (or care) what the topic was that we were subscribing to. It assumed we

knew what we were doing. In the same way, when we published our 'Hi There' message on the 'test' topic, the broker simply took it and sent it out to whatever clients out there that happened to be subscribed to the topic, if any.

The topic itself can be as simple as 'test' or extremely verbose. Some basic guidelines for topics are:

- Case sensitive
- Must be a UTF-8 string
- Must consist of at least one character to be valid.
- Wildcards are allowed when subscribing to a topic hierarchy, but when publishing to a topic, any message can be published to only a single topic (no wildcards are allowed when publishing).
- There are no topics created on a broker by default other than \$SYS system topics.
- Topics are created by a subscribing or publishing client. They are NOT permanent.
- Topics should not start with '\$', since those messages are for broker system messages.
- Topics should be specific in nature, not general.

Other than that, there are very little constraints on what a topic is

or how it is constructed. Typically, if a client needs to publish more than a single type of message, the topics will be level based with each level separated by a forward slash (/). For example, in the program we will be writing to monitor and publish the DHT sensor values, we should use two different topics. One for the humidity value and one for the temperature value. We could combine the values into a string and only use one topic, but in this case, we will publish them separately. Making a very gross assumption, we will provide for a complete home solution, with multiple sensors of various types in multiple rooms of the house. We could then start our topic(s) with:

**housesensors/**

This describes the topic to be one that will have sensor data specific to the house itself. This could include bedrooms, living areas and garden areas, but not something like a parking lot. The next level could possibly be floor based, as in first floor, basement and so on.

**housesensors/firstfloor/**

Next could be the room or area.

**housesensors/firstfloor/bedroom/**

Finally, we could set the topic to the specific type of value being published.

**housesensors/firstfloor/bedroom/humidity**

**housesensors/firstfloor/bedroom/temperature**

Notice that none of the topic strings have spaces in them. While spaces are not specifically prohibited, UTF-8 allows for many kinds of white space and could confuse things. You could also use mixed cases like 'HouseSensors/FirstFloor/Bedroom/Humidity', but since all topic strings are case sensitive, if you mistype a topic when publishing or subscribing, it could cause a good amount of time to debug things. I feel it makes it easier to go with all lower case.

For our Python programs to communicate MQTT, we will use the paho-mqtt library. You can install it using pip. For Python 2.x:

**pip install --user paho-mqtt**

Or for Python 3.x:

```
pip3 install --user paho-mqtt
```

Full documentation on the phao library can be found at

<https://www.eclipse.org/paho/client/python/>.

As a sample program for you to test with, I'll give you a short program that you can run and use the mosquitto\_pub to send messages to it based on sample code from the eclipse site. I've made a couple of changes to make it work properly here.

Of course, we need to import the library to get started.

```
import paho.mqtt.client as mqtt
```

Next, we'll create a callback function (shown top right) that will run whenever the client connects to the broker.

Next, we will make a callback function that runs whenever a message is received from the broker. It will print in the terminal the topic followed by the message.

```
def on_message(client, userdata, msg):  
    print(msg.topic+" "+msg.payload)
```

```
def on_connect(client, userdata, flags, rc):  
    print("Connected with result code "+str(rc))  
    # Subscribing in on_connect() means that if we lose the connection and  
    # reconnect then subscriptions will be renewed.
```

```
    client.subscribe('test')
```

```
    "+str(msg.payload))
```

Now we instantiate the client and bind our callback functions to it.

```
client = mqtt.Client()
```

```
client.on_connect =  
on_connect
```

```
client.on_message =  
on_message
```

Next, we connect to the broker, located at localhost. The 60 at the end of the call specifies a 'keepalive' time of 60 seconds, where the client pings the broker every 60 seconds.

```
client.connect("localhost",  
1883, 60)
```

Finally we tell the client to loop\_forever. Use the <ctrl>C keyboard interrupt to exit the sample program.

```
# Blocking call that  
processes network traffic,  
dispatches callbacks and
```

```
# handles reconnecting.
```

```
# Other loop*() functions are  
available that give a  
threaded interface and a  
# manual interface.
```

```
client.loop_forever()
```

Now, save the program as 'client1.py' and run it.

Go back to the terminal running mosquitto\_pub and republish the previous message to the 'test' topic. You should see it appear in the terminal window of our running Python program. I've put the code up on Pastebin at <https://pastebin.com/zL5ed9g9>

Next month, we'll update our original Python program from Full Circle Magazine #109 to support MQTT.

**Until then, have fun.**



## FULL CIRCLE 2018 SURVEY

Some questions are a requirement, some you can skip over if not applicable.

Your answers will help shape Full Circle, so please use your constructive criticism. If you don't tell us what you think, or what we're doing wrong, then we won't know.

**Survey URL:**  
<http://bit.ly/fcm2018>



**Greg Walters** is owner of RainyDay Solutions, LLC, a consulting company in Aurora, Colorado, and has been programming since 1972. He enjoys cooking, hiking, music, and spending time with his family.



# HOW-TO

Written by Elmer Perry

NEW

# Freeplane - Pt3

Tony Buzan introduced the term "mind map" during his BBC TV series Use Your Head in the 1970's. Buzan was a popular psychology author. Yet, the use of radial diagrams to display information had been around for centuries. Buzan introduced the world to his approach and set rules for the creation of mind maps. In his book Mind Map Handbook (<https://www.goodreads.com/book/show/3118034-mind-map-handbook>), Tony outlines 7 steps to making a mind map:

- Start in the center of a blank page.
- Use an image or picture for your central idea.
- Use colors throughout.
- Connect your main branches to your central image, and connect your second and third-level branches to the first and second levels, etc.
- Make your branches curved rather than straight-lined.
- Use one key word per line.
- Use images throughout.

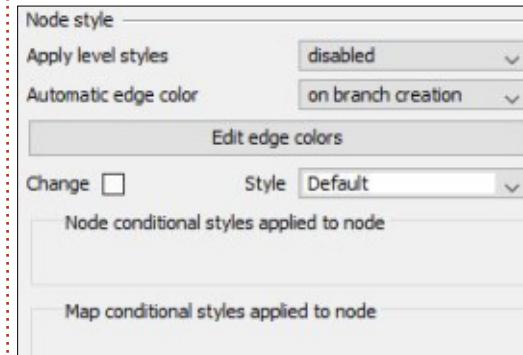
I would add an eighth rule:

customize the map to meet your needs. When using other diagramming methods, strict rules confine how you can build your map. With mind mapping, you are free to give your own meaning to symbols, codes, and groups.

Freeplane takes care of the connections between nodes by default. But, let's look at how you can modify the nodes and lines to make them mean something more to you. In particular, how you can change the colors, shape, and text of the nodes and lines to develop your coding system.

## THE TOOL PANEL

The Tool Panel gives you access to the properties of the individual nodes. To open the panel, press ALT+P on your keyboard, or from the menu bar, View > Controls > Tool Panel. You can also select the arrow on the right edge of the window. The Tool Panel docks to the right side of the window. The Tool Panel divides into sections related to the different properties.



## NODE STYLE

The node styles allow you to set the node to a predetermined style. We will discuss styles in a later article. These settings are disabled by default.

The first drop-down box applies the level styles. Levels are how far the node is from the root node. The 'for non leaf nodes' sets the level style on all nodes that are not at the end of a branch. You can think of nodes at the end of a branch like leaves on a tree. These are the leaf nodes. The other choice is for all nodes. This option includes the leaf nodes.

The Automatic edge color drop-down box sets the edge coloring for the nodes. When you select for

branches, each branch uses a different color of lines. Select for levels to make each step away from the root node a different color. When you select for columns, you get an effect like for levels, but the column is the position rather than the level. You can grab a node and move it into a new column without affecting its level. If you select on branch creation, each new branch from the root node gets a new color.

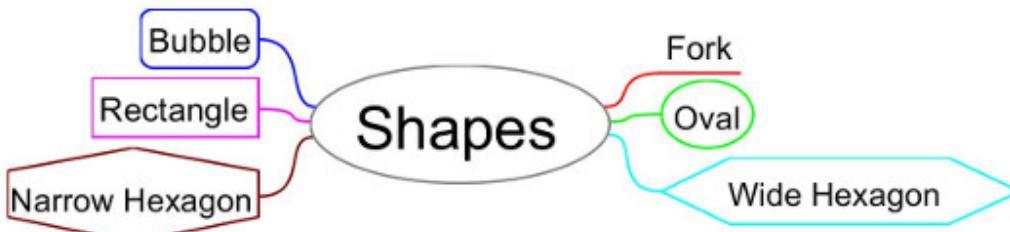
The Edit edge colors button activates when you select an Automatic edge color other than Disabled. Clicking the button opens a dialog window displaying the different color levels. Click the level swatch to open a color selection dialog. Select a new color for the level and click the OK button to change the color for the selected level. Use the up and down arrow buttons to move the levels up and down in the hierarchy. The X button removes the selected level color, and the + button inserts a new level color. The default number of levels is 11, but I have added 50 without the

program complaining. In most cases, you will rarely go more than 11 levels deep in your mind maps, except for the rare case of a very large map. But, if you are creating a different color for each branch, you could soon need more than 11.

The Style drop-down box lets you select a predefined node style for the node(s). We will talk more about predefined styles in a later article. For now, know that you can select them here. The conditional styles are also another topic of another article.

## COLOR OF WHOLE CORE

Color of whole core	
<input type="checkbox"/> Change	Text <input type="text" value="#000000"/>
<input type="checkbox"/> Change	Background <input type="text" value="#ffffff"/>
Core text	
<input type="checkbox"/> Change	Format <input type="button" value="Standard"/>
<input type="checkbox"/> Change	Node numbering <input type="checkbox"/>



The color section gives you two swatches. One for the text and the other for the background. Clicking the swatches brings up a color dialog where you can select the color you want. These colors affect only the currently selected nodes. Always make sure you select contrasting colors.

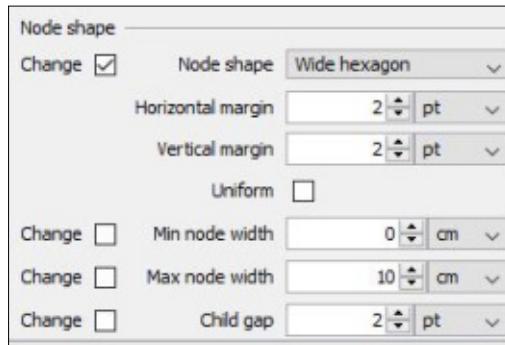
**NOTE:** The Core text section will be an article on its own.

## NODE SHAPE

The Node shape section is where you manipulate the geometry of the node. Most of the shapes are self-explanatory. The fork shape is the traditional mind map underlined node style. Most child nodes in the default template are fork nodes by default.

When you select the as parent shape, the node will follow the shape of its parent node.

Combined is a special node. When you expand the children of a combined node, the node takes the shape of a fork. When you collapse the children, the node takes the bubble shape.



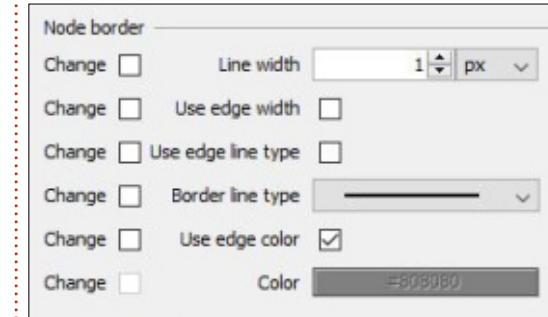
The Horizontal margin and Vertical margin set the distance from the core text to the node border. You can select a unit of measure of pixels (px), inches (in), millimeters (mm), centimeters (cm), and points (pt). These units are available for any settings using measurements.

The Uniform checkbox adjusts the height of the node to match the width of the node.

The Min node width and Max node width are the minimum and maximum widths of the node. The widths do not include the margins. The margins add to these settings. The default max width is 10 cm.

The Child gap sets the distance between the parent and its children.

## NODE BORDER



# HOWTO - FREEPLANE

The Node border section allows you to change the width, style, and color of the border around the core text.

You can define a width using the Line width spinner control and the drop-down list to select the measurement type. If you want the border the same as the edge coming from its parent node, check the box Use edge width.

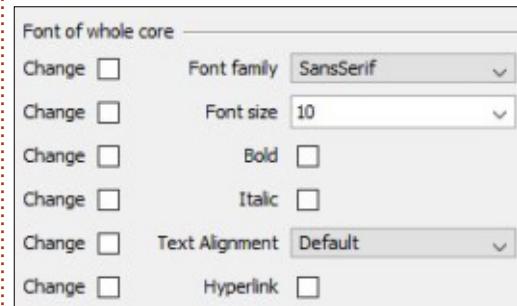
Select the Use edge line type to make the border line the same type as the line leading up to the node. The Border line type drop-down list lets you select a different line style. Your choices are solid, short dash, long dash, dots, and dot-dash.

For the border color, you can check Use edge color. Otherwise, you can click on the Color swatch and select a color from the color dialog.

## FONT OF WHOLE CORE

The Font of whole core section allows you to change the family, size, and styling of the core text font. Remember this affects only the core text and not the details

text. To change the details text, you edit it in the editor dialog.



From the Font family drop-down list, you can select the font family you want. The list shows the fonts installed on your computer.

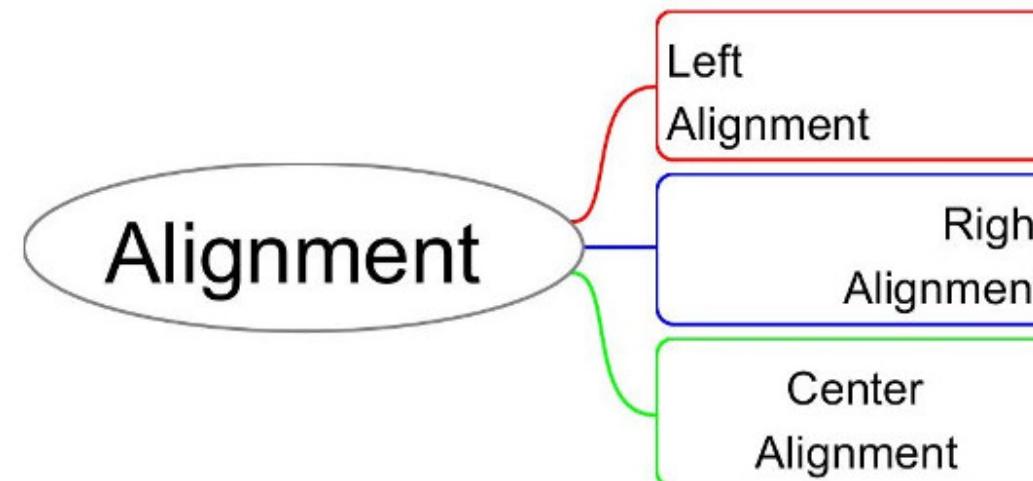
Select the size of the font from the Font size drop-down list. The size list box is a combination list/text box. You can select the size from the default sizes in the

list, or type in a nonstandard size.

Check the boxes for Bold or Italic to apply those styles to the text.

The Text alignment drop-down list sets the alignment for the text. By default, the nodes are the width of the text they contain, hiding the alignments' effect. The alignments appear when you have a fixed-width node, or the node contains multiple lines of text. To create a fixed-width node, set the minimum and maximum width to the same value.

The Hyperlink checkbox underlines the node text like a hyperlink. This works only when you have a hyperlink set to the

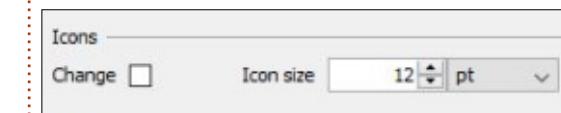


node. We will cover hyperlinks in a later article.

## ICONS

In the Icons section, you can change the size of the icons in the node. Use the spinner box to set the numeric size, and the drop-down list to select the measurement type. Icons add visual clues to the nodes.

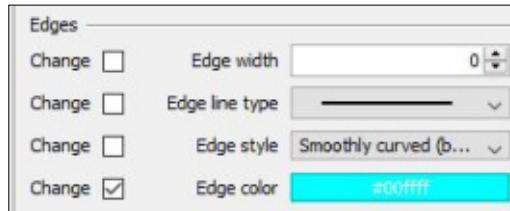
Increasing or decreasing the size can influence the prominence of the clue. Often the icon itself is more important than the size. Yet, if you want to use an icon as the image for your central node, increasing the size is a must.



## EDGES

Edges are the lines connecting child nodes to their parent. You can change the width, line type, style, and color of a node's edge. By modifying the edges, you can create a visual clue to the level, meaning, or branch of a node. In the default template, each branch has a different color edge. As you

read earlier, you can change this to give a different color for each level, branch, or column. You can also disable automatic colors.

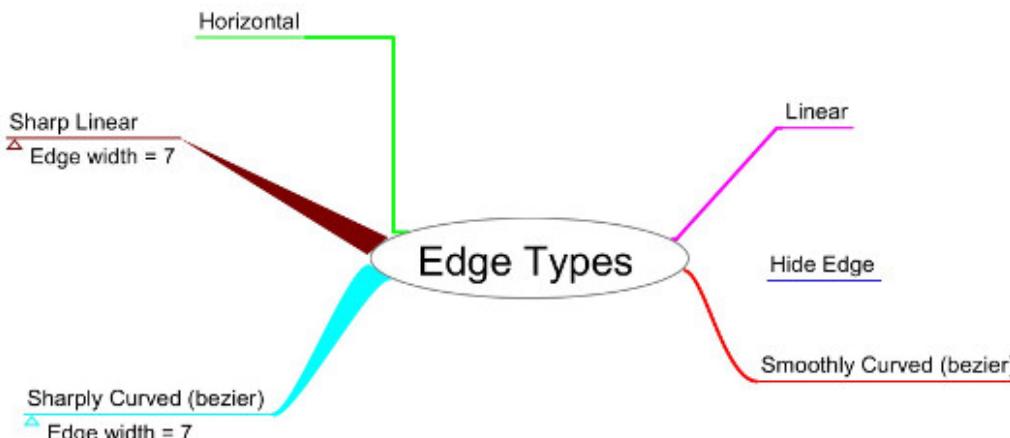


The Edge width is set using the spinner box. The number here is a scale rather than a measurement amount.

To change the type of line used, select from the Edge line type drop-down list. The types are a solid, short dash, long dash, dot, or dot-dash line. You can use the line types as a code for different

relationships between the node and its parent. For example, use a dashed line to show a hidden or temporary relationship. The choice is yours.

The Edge style controls the way the line is created. There are 6 different edge styles. The default style is the Smoothly curved (bezier). This best fits the suggestion of a curved rather than a straight line, but you can make a case for straight lines too. If a straight line makes sense to you, then the Linear style gives you a straight line from the parent to the node. Another form of a straight line is the Horizontal style. This style creates edges with sharp 90 degree angles. Hide edge does not display an edge between the



parent and child node. For a unique touch, use the Sharply curved (bezier) or Sharp linear styles. The Sharply curved (bezier) is like the smoothly curved except the curves are tighter. If you increase the width, the edge becomes tapered from parent to child. For the Sharp linear style, you need a width greater than 0. The style creates a straight line tapered at the parent end and comes to a point at the child end.

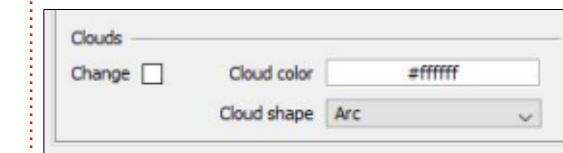
Clicking the swatch for Edge color displays a color dialog. Select the new color for the node's edge and click OK. The new color will override automatic color settings.

## CLOUDS

I will cover clouds and what they are in an article on grouping. For now, know you can change the Cloud color and Cloud shape here. The four shapes are Arc, Star, Rectangle, and Rounded Rectangle.

Tony Buzan gave us 7 guidelines for creating mind maps. Freeplane allows you to apply these guidelines as well as break them. The flexibility lets you create your

own unique style of mind mapping. For me, mind mapping is not about following guidelines but finding what works for you. Tony's guidelines are a starting point. Mind maps allow you to create associations between objects and ideas. As we continue learning about Freeplane, we'll discover more ways to create associations.



**Elmer Perry** is a technical support rep for an international keyless access company. He enjoys writing, woodworking, and technology. He lives in Leicester, NC with his wife.



# HOW-TO

Written by Miguel Menéndez

**A**pplications in Ubuntu Touch (UBports) are programmed on the computer and run in a real device. To do this, it is necessary to use a set of tools that transform the source code into the application executable. There are several tools you can use: the most traditional is the Ubuntu Touch SDK, while the most promising is Clickable.

The Ubuntu Touch SDK is no longer supported. It may seem like a bad idea to spend time in the course explaining how it works. While it is true, there are some premises I would like to comment on. Both the SDK and Clickable follow the same workflow. The application source code is written, compiled, and an application executable is generated. To be able to run the ARM application on a PC, you need to use a container that "adapts" both architectures.

At the last UbuCon, I gave a basic programming workshop. In order to simplify the installation process, I prepared a virtual machine with the Ubuntu Touch

SDK. Just download the file, set up your virtualization environment, and start programming.

## INSTALLING THE VIRTUAL MACHINE

The virtual machine uses Ubuntu Mate 16.04. The user and the password are the same: "ubucon". I recommend you to download the virtual machine in parallel. It's 12 GB and can take a long time to download.

The link is: <https://bit.ly/2JldjBh>. The host computer can run any operating system that can run VirtualBox. Here are the steps for Ubuntu 16.04.

The first step is to add the VirtualBox repository.

```
sudo nano  
/etc/apt/sources.list
```

Add to the end of the file:

```
deb  
http://download.virtualbox.or  
g/virtualbox/debian xenial  
contrib
```

Save the changes and add the Oracle signature:

```
wget -q  
https://www.virtualbox.org/do  
wnload/oracle_vbox_2016.asc  
-O- | sudo apt-key add -
```

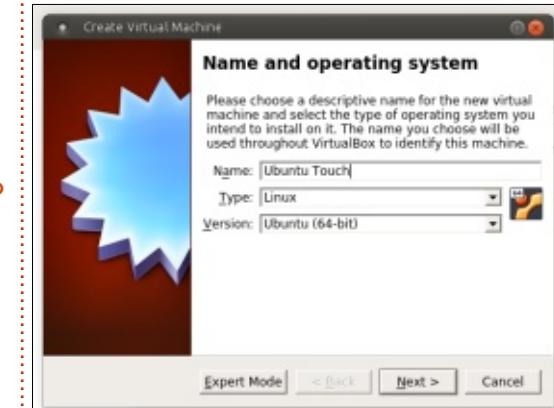
Install VirtualBox.

```
sudo apt-get update; sudo  
apt-get install virtualbox-  
5.2 dkms build-essential
```

When finished you can launch it from the desktop menu or by typing the command

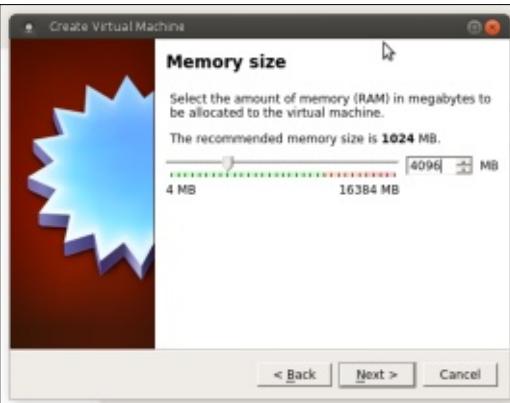
```
virtualbox
```

Click on the New button and configure the name and operating system.



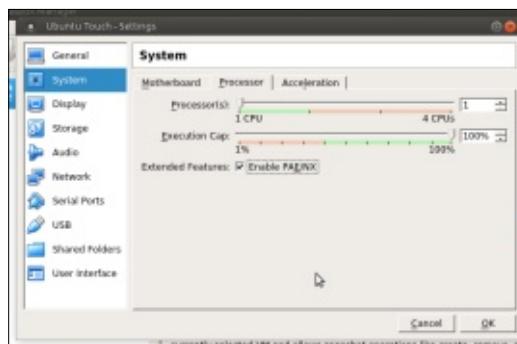
I recommend you to use the maximum RAM you have available in the system.





Click on the Settings button. In System, Processor, select Enable PAE/NX to improve the performance of the virtual machine. Your computer's virtualization options may be turned off. In that case they should be activated in the BIOS configuration.

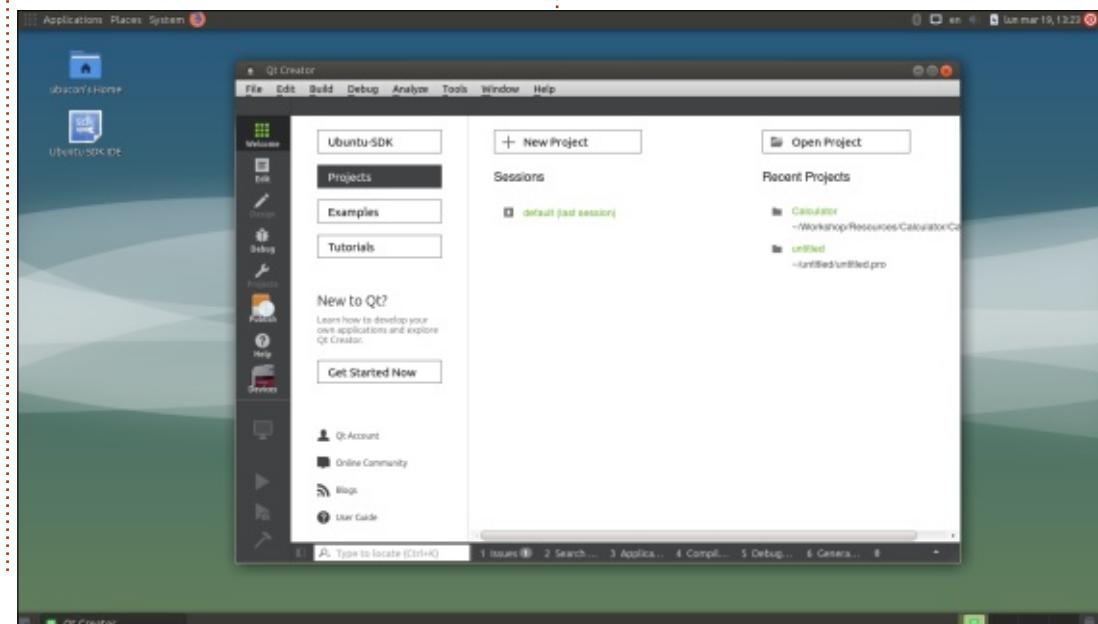
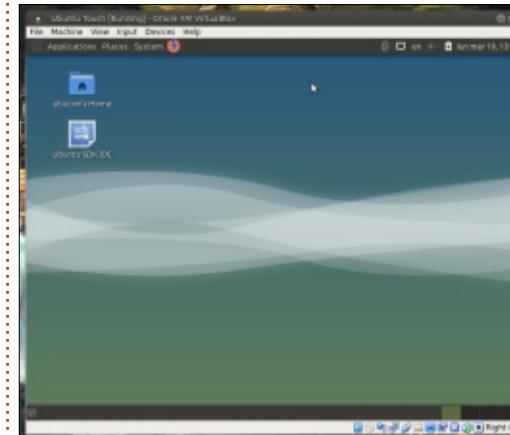
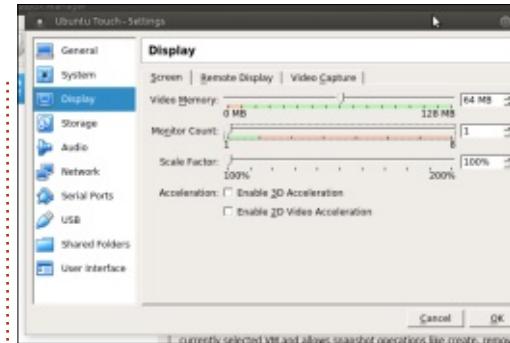
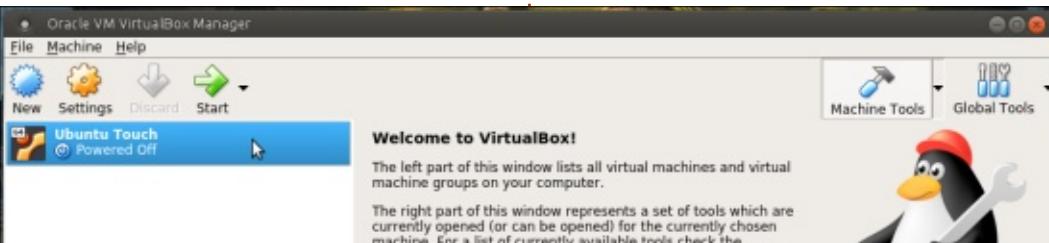
You must select Use an existing virtual hard disk file. Then select the virtual machine file you downloaded earlier.



In Display, you can configure the graphics memory of the virtual machine. Even if your computer supports it, I recommend disabling 3D acceleration. The SDK tools use OpenGL acceleration, and it does not work well within VirtualBox.

The virtual machine is already created and now needs to be configured.

The virtual machine is now ready.



Start the Ubuntu Touch SDK by double-clicking on the icon.

## CONCLUSIONS

We have already prepared the working environment for the course. In the next delivery, we will start with a Web application (WebApp). Although programmed into a virtual machine, it is possible to connect a phone or tablet (with UBports) and run the application natively.

If you have any questions, you can ask them in the Telegram group of the course:

[https://t.me/ubuntu\\_touch\\_course](https://t.me/ubuntu_touch_course)



# HOW-TO

Written by Mark Crutch

This month, I'm going to look at an "application" which actually manifests itself as a collection of Inkscape extensions: JessyInk. This is a way to turn Inkscape into an editor for presentations (think PowerPoint and similar) that can then be viewed with a web browser. To achieve this, JessyInk modifies your document; it adds JavaScript code – to allow keyboard and mouse navigation and to implement some basic transition effects. A good example of what JessyInk is capable of can be seen in the "JessyInk 1.5.5 Showcase" presentation, which can be found on Canonical's Launchpad site:

<https://launchpad.net/jessyink/+download>

You can click the link on the page to view this with any modern SVG-capable web browser, but a better idea is to right-click on the link and save it to your local machine first. One recommended approach to creating a JessyInk presentation is to simply load this showcase into Inkscape and replace the contents with your

own, in which case having a local copy of the file is a necessary first step. Note that, in my testing at least, I had to download the file directly from the Launchpad page: loading it into the browser first and then saving the running document always resulted in a file that failed to reload afterwards.

Rather than modifying the showcase document, I'm going to demonstrate how to create a JessyInk presentation from scratch. I recommend having both Inkscape and a web browser open throughout. As you make changes to the Inkscape file, you can save them (CTRL-S), and then immediately reload the file in the browser (F5) to check the results. So with your browser at the ready, and a blank document in Inkscape, let's begin...

A blank Inkscape file knows nothing about JessyInk and its extensive JavaScript functions, so the first step is to initialise it by running the Extensions > JessyInk > Install/update... extension (for brevity I'll refer to extensions just

by their name from now on; they're all in the Extensions > JessyInk menu). There's nothing to do here, other than to click the Apply button, and then close the dialog once it's finished.

For consistency in presentations, it's common to create a master slide, containing elements that will be present in all the slides, such as a particular background or company logo. In JessyInk terms, one particular layer of your drawing can serve as a master slide, so we'll make it blindingly obvious by opening the Layers dialog and renaming the existing layer to "MASTER". Then it's worth opening the Document Properties dialog and setting the units to "px" and the page size to suit the screen you'll be presenting on (1024x768 in my case). This isn't essential, as the browser will scale your SVG to fit the screen, but does at least give you some idea of how the final presentation will appear. Note, however, that although the browser will scale the document, the aspect ratio will be preserved, so presenting on a

screen of a different ratio will result in blank borders.

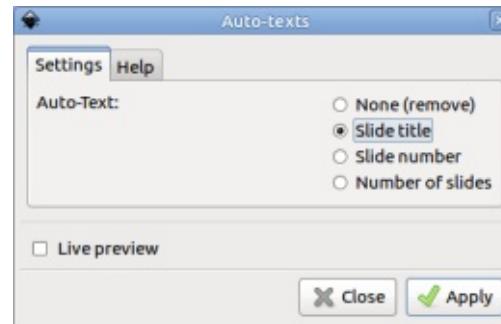
Finally, add common page elements to the document: I've drawn a rectangle with a gradient fill as a background, then added some solid rectangles with placeholder text for the slide title, and "nn of NN". The latter has been implemented as three separate text objects, for reasons which will become clear shortly. Here's how our master page looks:



Our master slide may look correct, but, at the moment, JessyInk doesn't know that it should be treated differently to any other slide. Run the "Master slide..." extension and supply the name of your layer ("MASTER" in my case) before clicking Apply and

then closing the dialog when it's finished.

Before moving on from the master slide, let's deal with the placeholder text we've added. Select the "SLIDE TITLE" text element and run the "Auto-texts..." extension. This is used to define text elements on the page that will be dynamically replaced when the slideshow runs. For this element, you should choose the "Slide title" radio button and click Apply. Now, with the dialog still open, select the "nn" text and change the radio button to "Slide number" before applying. Finally select the "NN" text and change the radio button to "Number of slides", then apply once more. You

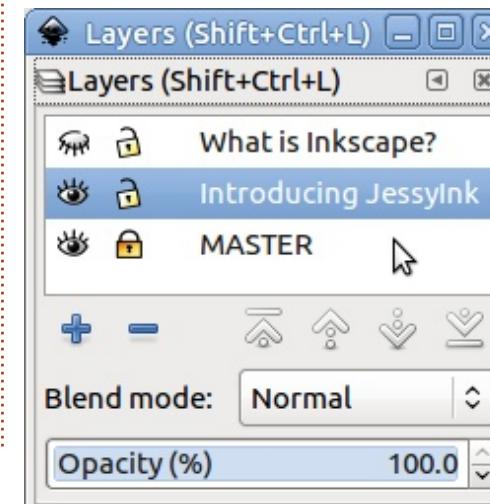


can now close the dialog.

We've finished with the master slide for now, so it's probably a good idea to lock the layer to prevent accidental changes when

we start adding the real content to our presentation.

Now it's time to add some real slides. Because Inkscape (and SVG) has no inherent ability to handle multi-page documents, we can't just have each slide on a new page and switch between them using tabs or thumbnails, as you might in other presentation programs. Instead, we have to fake the effect of multiple documents by creating each slide on its own layer. This approach works, but requires a little discipline to work with: at any time you should only have the master slide and one other slide visible. When you want to switch between slides, you must remember to hide the old slide, otherwise you could easily be confused into thinking that some



of the content of the old slide is actually part of the new one. You also need to make sure you select the new layer, otherwise your modifications will apply to the wrong slide. To illustrate this, let's create a couple of layers for our first two slides, and name them based on the content we intend to put in them.

Perhaps counter-intuitively, the order of the slides runs from bottom to top, so the first slide is the one called "Introducing JessyLink", whilst the second is named "What is Inkscape?". Note that the master slide is locked, and only the master slide and the first slide are visible. The first slide is currently selected, so it's time to add some content. This can be any content that would normally go into an Inkscape document, including text, vector graphics and bitmaps. Remember, however, that it will eventually be rendered by a web browser, so the final display will be limited by the browser's SVG engine: don't use flowed text, and be aware that fonts may be different between your Inkscape machine and the final viewer. If you must use particular fonts then you should probably convert them to paths – but remember to keep a

copy of the un-converted presentation, otherwise you won't be able to edit the text in future.

With some content in both slides, it's time to test the presentation in a browser. Load the file from disk (press CTRL-O in the browser to bring up a file selector), and optionally press F11 to put the browser into full-screen mode (it's the same key to return to normal afterwards). You should see that the placeholder text in the title, and in the page count at the bottom, have been replaced

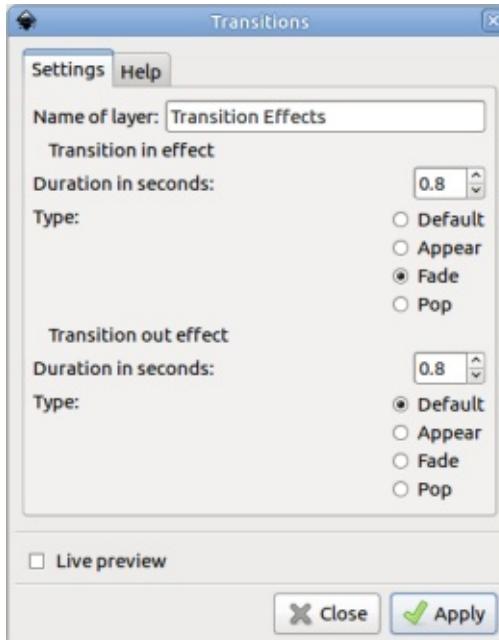


with real content.

To move through your presentation, click the mouse button or use the LEFT and RIGHT cursor keys. HOME and END will take you to the start and end of your presentation, respectively – although with only two slides, they're somewhat redundant at

this point. Let's build up our presentation a bit more with another slide, describing JessyInk's transition effects.

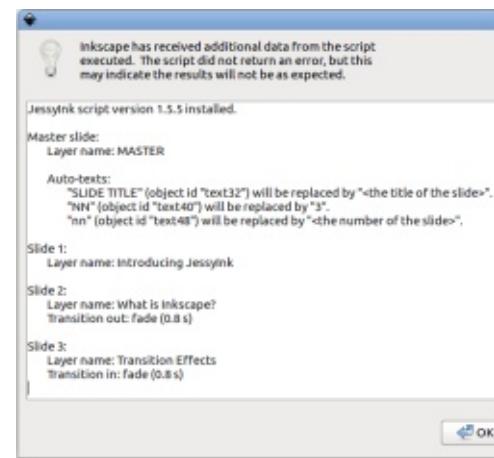
The ways in which a slide can transition in or out are limited in JessyInk, but that's probably a good thing: if you're relying on fancy effects to keep people interested then you need to rethink your presentation! To set a transition on a slide, it's handy to first double-click on the layer in the Layers dialog, then copy the layer name to the clipboard. You'll need to paste this into the Transitions... dialog to identify



which slide you're adjusting.

You can then choose how the slide should appear and disappear: Appear results in one slide immediately replacing the next with no animation. Fade causes the slide to fade in. Pop scales the slide from a small initial rendering up to its full size. Fade and Pop work best when the previous slide uses one of them as a transition-out effect, otherwise they can be quite jarring. You can also adjust the duration of the effect, although I've found the default value of 0.8s to be fine in most cases. You may be wondering about the Default transition type. This removes the in or out transition, effectively setting it back to the default behaviour – which seems to be identical to the Appear option.

After editing a few slides it can be easy to lose track of the transition state of each of them. The Summary... extension is useful here: on clicking apply it produces a dialog with a summary of the presentation, including the transition types and times you've set. The dialog always open a little small, but you can resize it rather than reading the summary line-by-line in a tiny textbox.



As well as slide transitions, similar animations can be applied to individual elements of your slide, using the Effects... extension. In this case the transition is applied to each selected element, and an "Order" field is used to determine what sequence the effects are applied in. The elements are transitioned starting with Order 1 and working upwards. Multiple elements with the same Order will be transitioned at the same time. The None (default) option is used to stop them transitioning, such that they are always present on the slide.

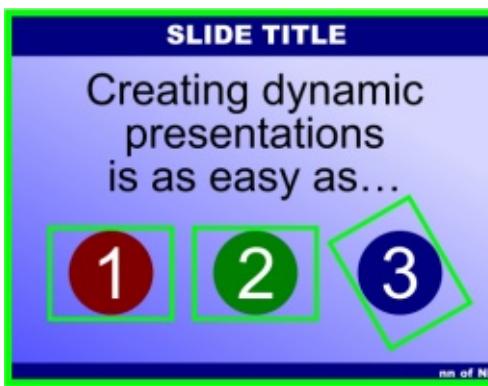
By now it's probably time to test your presentation once more. Simply save the Inkscape file, then press F5 in the browser to reload

the file. There's no need to quit and re-launch either application, making it easy to quickly iterate your design to refine the fine details of your presentation.

If JessyInk was limited to simple slideshows with a few transitions it would be of little benefit over using LibreOffice Impress. But it also offers the ability to create "zoom and pan" presentations – originally made popular by a website called Prezi ([prezi.com](http://prezi.com)) with a fresh take on presentations that are more dynamic than the linear PowerPoint shows of old. Prezi's editing software originally required the use of Adobe Flash, though they now have an HTML5 offering. There's also an Open Source program called Sozi that performs the same trick, if you want to try another alternative to JessyInk.

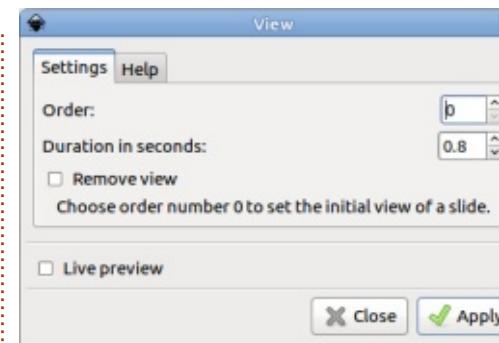
A common theme in these types of presentation is that a single slide is used to give a big picture overview of a topic, then the viewing program zooms, rotates and pans the viewport to "dive in" to more detailed information. For our purposes I'm going to create another slide with three further "views" within it. I've marked out

each view (including the initial view of the whole slide) with a rectangle in Inkscape – and given them bright green strokes to ensure they stand out. They are hidden in the final presentation, so you can use any color or stroke style you want to help you keep track of the individual views.

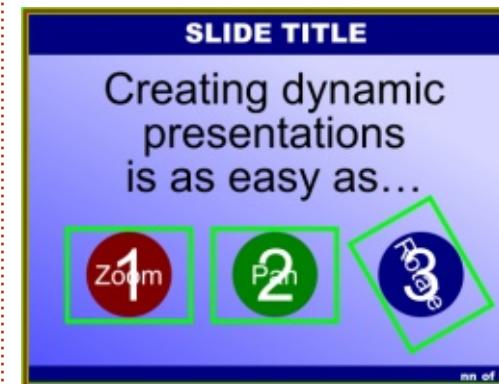


I've kept the same aspect ratio for each of the rectangles as I've used for the presentation as a whole. That way I can ensure that my views are properly sized and positioned relative to the content. The one around the "3" has also been turned to demonstrate that rotation is allowed, as well as zooming and panning. With the views marked out, we just have to select each one in turn and use the View... extension to define the order in which they are visited, starting at 0 for the initial state of the

slide.



Just zooming in on three numbers isn't terribly useful, but by combining the zoom order with some object animation effects, you can make parts of the slide fade in and out as the viewer is panned around. Here's the final version of this slide, looking a little more cluttered:



In practice, however, the "1" fades out during step 1 of the slide order, and the "Zoom" text fades in

at the same time. Similar rules have been applied to the other areas, and the red outline is used as a final view. The result is that the slide shows 1, 2 and 3 when it's first displayed, then zooms and pans to the red circle (showing the word "Zoom"), pans to the green one (showing "Pan"), and pans and rotates to the third one (showing "Rotate"). Finally the presentation zooms back out to the overview, which now shows the words instead of the numbers.

Now that we have a finished presentation, I'd like to mention a few more features of JessyInk. Pressing "i" during a presentation will bring up an index page showing all your slides, letting you easily jump back or skip sections using the mouse or keyboard. Pressing "d" will switch to drawing mode, with which you can annotate a slide on-the-fly. By pressing particular keys, you can even change the color and size of the pen. Run the Keybindings... extension to view or change all the various keyboard shortcuts that JessyInk offers.

To conclude, JessyInk is really a remarkable example of what an Inkscape extension can achieve

with a little lateral thinking and a lot of JavaScript! The smoothness of the resultant presentations, however, is highly dependent on your browser's performance – something to bear in mind before you stand before a room full of people to give a talk. Nevertheless, if you're more comfortable in Inkscape than LibreOffice, it could prove to be an invaluable tool to know about.



Mark uses Inkscape to create three webcomics, 'The Greys', 'Monsters, Inked' and 'Elvie', which can all be found at

<http://www.peppertop.com/>



# RESEARCHING WITH LINUX

Written by S. J. Webb

REDCap

The government, for most countries, is the largest funding source for clinical research. The second group of research grants comes from the corporate world. Unfortunately, the worlds of corporate greed and academia advancement rarely align in research. Therefore many universities form an educational cooperative to develop coordinated research studies. And if these cooperatives are highly successful, then the research tools are released for use. One such tool is REDCap, further details can be found at [www.project-redcap.org](http://www.project-redcap.org).

REDCap stands for Research Electronic Data Capture. It is an interesting tool that can be used for database management and online surveys. REDCap is used in over 100 countries by 2000+ institutions.

It is free to use, but it does not qualify under the free and open software since the software license bars corporate use.

Vanderbilt University developed

The screenshot shows the REDCap interface. The top features a large logo with a red baseball cap icon and the text "REDCap" in large black letters, with "Research Electronic Data Capture" in smaller red letters below it. Below the logo, there's a brief introduction about using government grants to reduce lag time for biomedical researchers. To the right, another section discusses how devices can use the software and how a university signs up with an administrator assigned as the onsite help desk. At the bottom, a detailed view of the "File Repository" page is shown, featuring tabs for "User Files", "Data Export Files", and "Upload New File". A sub-section titled "Adding new file" shows fields for "Document" and "Name/Label".

The program is well documented across numerous educational facilities. The homepage can be quite daunting. The first option is to choose the project type: database or survey. The interface for both projects looks about the same. You can import outside data sets into REDCap to develop databases.

I personally have no experience on the database development. I only experienced the survey side data management. I began developing surveys to incorporate into some of my proctored classes. The main purpose of these surveys is to automate functions of my job. These surveys capture basic data.

The survey development is done in two sequential segments: development and production. In the first portion, it is a testing mode. It is here where you can see the basic survey outline. There are numerous fields to enter for a simple question. Once the fields are completely entered, the survey is then enabled with a simple online website link created at the



# RESEARCHING WITH LINUX

end. The survey is then shifted into the last stage, production. Once the survey is in production, it is impossible to change.

You have to translate the survey back to development to make changes.

The final surveys look sharp and professional for the end user. The surveys can be sent at once to selected emails. Each survey can be set for entry once the link is entered. Plus the link can be a

## Edit Field

You may add a new database field to this data entry form by completing the fields below and clicking the Save button at the bottom. When you add a new field, it will automatically be appended to the form on this page. For an overview of the different field types available, you may view the [Field Types video \(5 min\)](#).

### Select a Type of Field

Text Box

#### Field Label

Patient Contact

Variable Name (utilized during data export)

emergency\_contact

ONLY letters, numbers, and underscores

Validation? (optional)

— None —

Required?\*

No

Yes

\* Prompt if field is blank

Identifier?\*

No

Yes

Does the field contain identifying information (e.g. name, SSN, address)?

Field Note (optional)

include name & phone number

Branching/Skip Logic (optional)

[How do I use this?](#)

Save

single or multiple use admission. collected. Despite this fact, REDCap is a great research tool.

When the study is over, the results can be downloaded into a simple spreadsheet.

However the consistent complaint is that REDCap is quite rigid in the workflow. It is hard to relate Survey A to Survey B. Therefore, many REDCap Researchers perform strong testing during the developmental mode. If the survey is poorly constructed, then poor data is



**SJ Webb** is a researcher coordinator. When he is not working, he enjoys time with his wife and kids. He thanks Mike Ferarri for his mentorship.

Please complete the survey below.

Thank you!

Please enter your (the examiner) first and last name.

\* must provide value

Please enter your (the examiner) ID number

\* must provide value

Please enter the volunteer's first and last name.

\* must provide value

Please enter the volunteer's approximate weight in pounds.

Please enter the volunteer's approximate height in inches.

Please designate the side of the table you are performing the assessment from.

Left  Right

reset

Please note which lumbar you are performing your assessment on.

L1  L2  L3  L4  L5

reset

Which side of the lumbar moves less or which side is the tissue tighter?

Left  Equal  Right

reset

Please describe the tissue characteristics.

Expand



# EVERYDAY UBUNTU

Written by Richard Adams

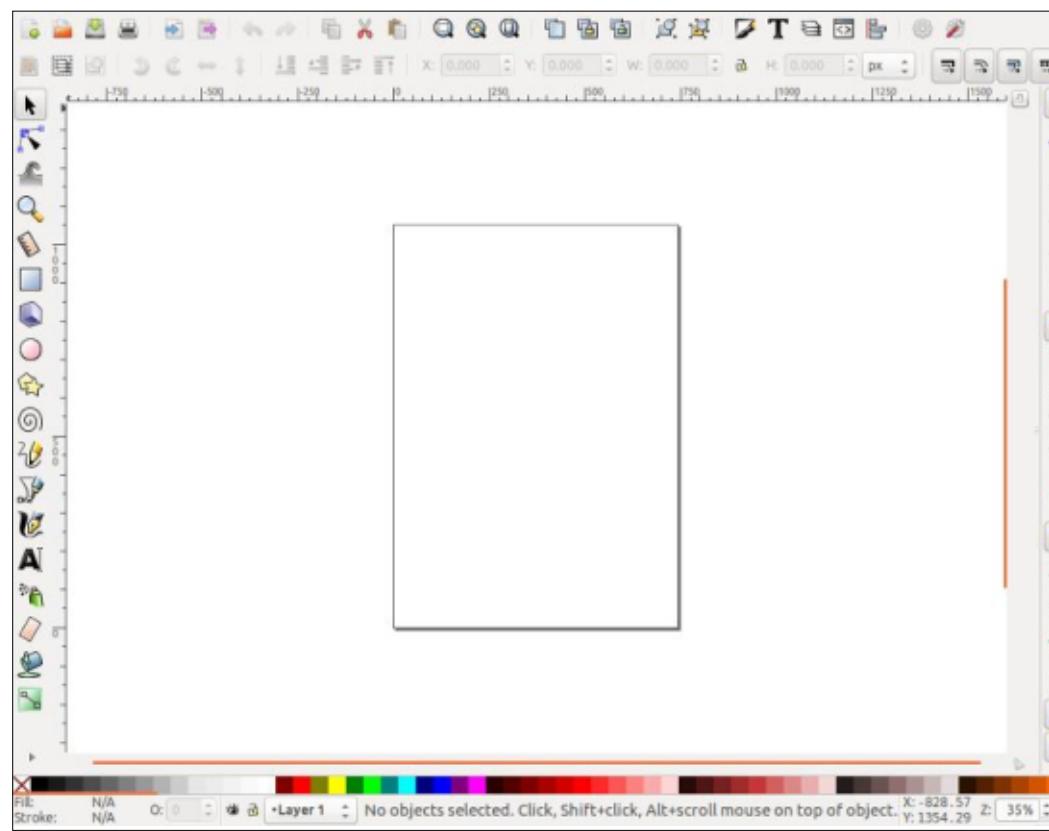
Last month, we talked about office suites, media players, and connectivity applications. This month, we'll conclude our basic suggestions on essential software to install on a newly deployed Linux system

I enjoy working with graphics on the computer, particularly since my main system, a Fujitsu Lifebook T4215, is pen enabled and allows me to draw on-screen, so I always install the vector-based drawing package Inkscape, also available on Windows and MacOS. The advantage of being able to learn one application, yet use it on different platforms, is a great one, so you don't have to learn multiple applications as you move from one system to another. I personally tend to discard this advantage to some degree by installing multiple applications on Linux for a specific purpose, but I also tend to use one application a good deal more often than any others, in most cases. In addition to Inkscape, I always wind up with a couple of drawing packages installed by the office suites I use, so I also have

LibreOffice Draw, and Krita in Calligra Office. Full Circle previously published a series on Inkscape that has been compiled into several Full Circle Special Editions, available for download here:

<https://fullcirclemagazine.org/inkscape-special-editions/>.

Here's the Inkscape interface:



## Suggested Applications Pt.2

Sometimes, it's advantageous to draw graphics on a photo or to use a bitmap based drawing package. I always get Karbon with Calligra Office, and I also use the venerable software classic, the GIMP. The GIMP is a very capable photo editor, and is also used to help produce this column, as Full Circle requires embedded graphics to be in 800 pixel wide JPG format.

I do screenshots for the column, which the system defaults to saving in PNG format, load them into the GIMP, scale them to 800 pixels wide, then export to JPG format. The process works well, unsurprisingly, considering the GIMP has been in development since 1995. It ought to be rock-solid by now, and so it is. The GIMP is also available on MacOS and Windows. On the next page, bottom left, is what the GIMP looks like in single-window mode, which I prefer.

I do consider some games on the system to be pretty essential, as it's nice to take a break from any work, from time to time, and clear the cobwebs out of the ol' noggin. In fact, I'm going to go play NJAM right now....

I'm back, did you miss me? We'll look at games in more detail in an upcoming column, but I'll just namedrop here that I always install the Pac-Man style game NJAM, the Burgertime clone Burgerspace, Mahjongg, and DOSBox to run old DOS games (of which I have a



ridiculous number, most never actually played through to the end). I also have a number of terrific games from GOG.com, which we'll discuss further in the upcoming 'retrogaming' column.

I also always put a version of MAME, the Multiple Arcade Machine Emulator, on every computer I own, because playing actual original Donkey Kong, Space Invaders, Joust, Mr. Do, Pole Position, and other 70's-80's vintage arcade classics, is one of

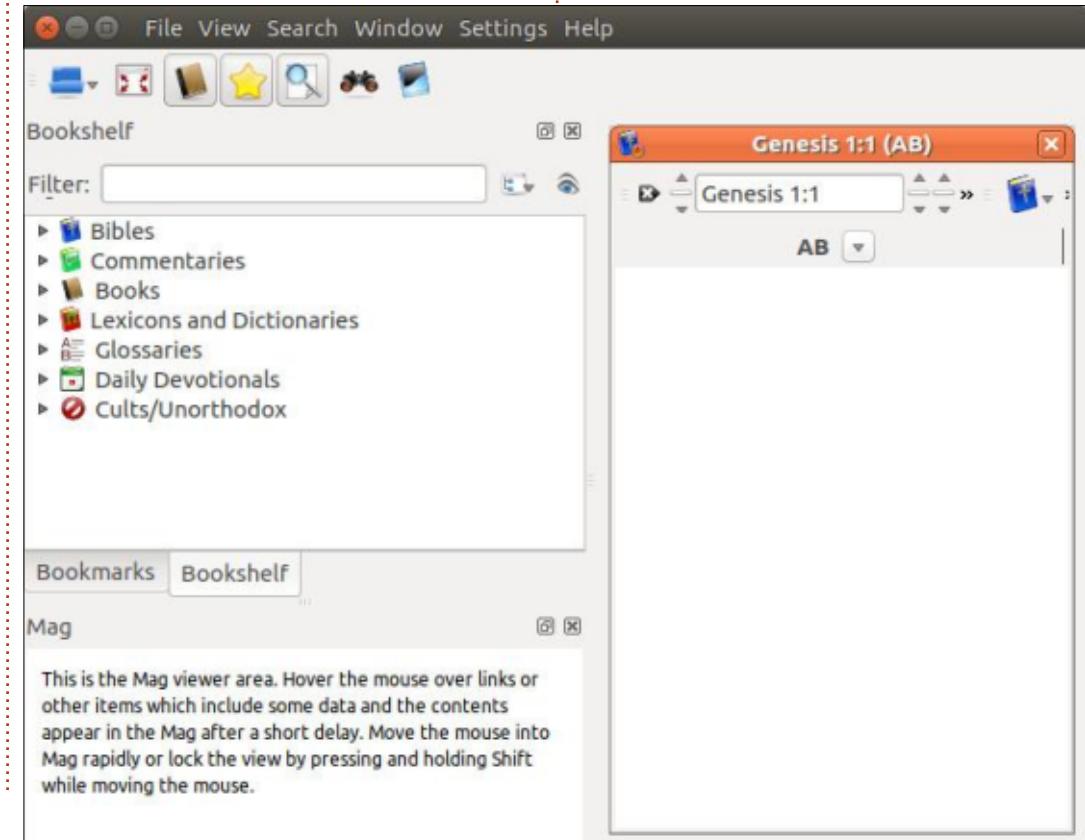
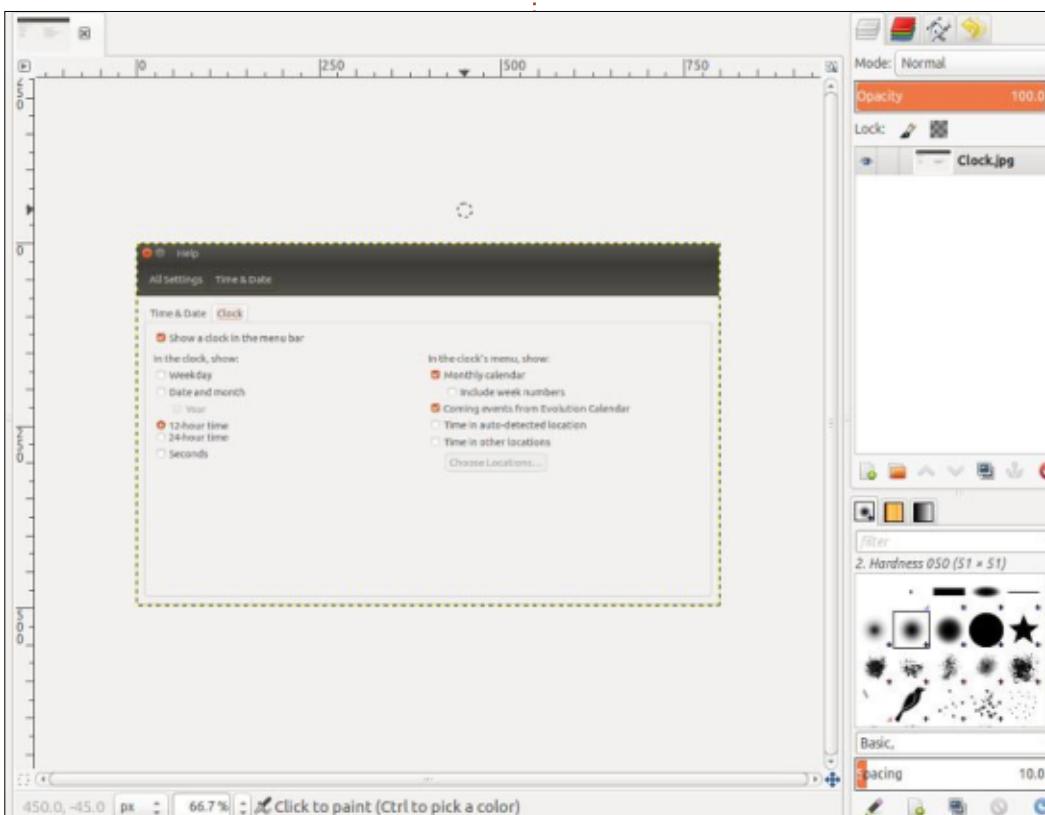
the most essential uses of a computer, in my book. There are also multiple home consoles emulated on Linux, for those who can't live without Super Mario or Sonic the Hedgehog. Again, we'll discuss further in a later column.

I insist on installing Bible study software on all my computers, and can recommend BibleTime and Xiphos Bible Guide on the Linux platform. BibleTime uses the same modules as other Crosswire products like "The SWORD Project"

(Windows). I happened to already have downloaded many free modules from Crosswire on Windows before ever setting this system up. Fortunately, the modules can be transferred from Windows to Linux and still work just fine. BibleTime can access a number of classic resources like commentaries, atlases and dictionaries, concordances, literary works, different translations of the Bible itself, and a large variety of other works. Bibletime:

The "Xiphos Bible Guide" also uses the Crosswire modules. On the Windows side of things, I have Bible Explorer, which uses WordSearch modules. I have not found anything on Linux yet that uses WordSearch. If anyone knows of such an application, please write at acer11kubuntu@gmail.com and I'll mention it in a future column.

I like to install other educational or reference software on all my computers, and on Linux,

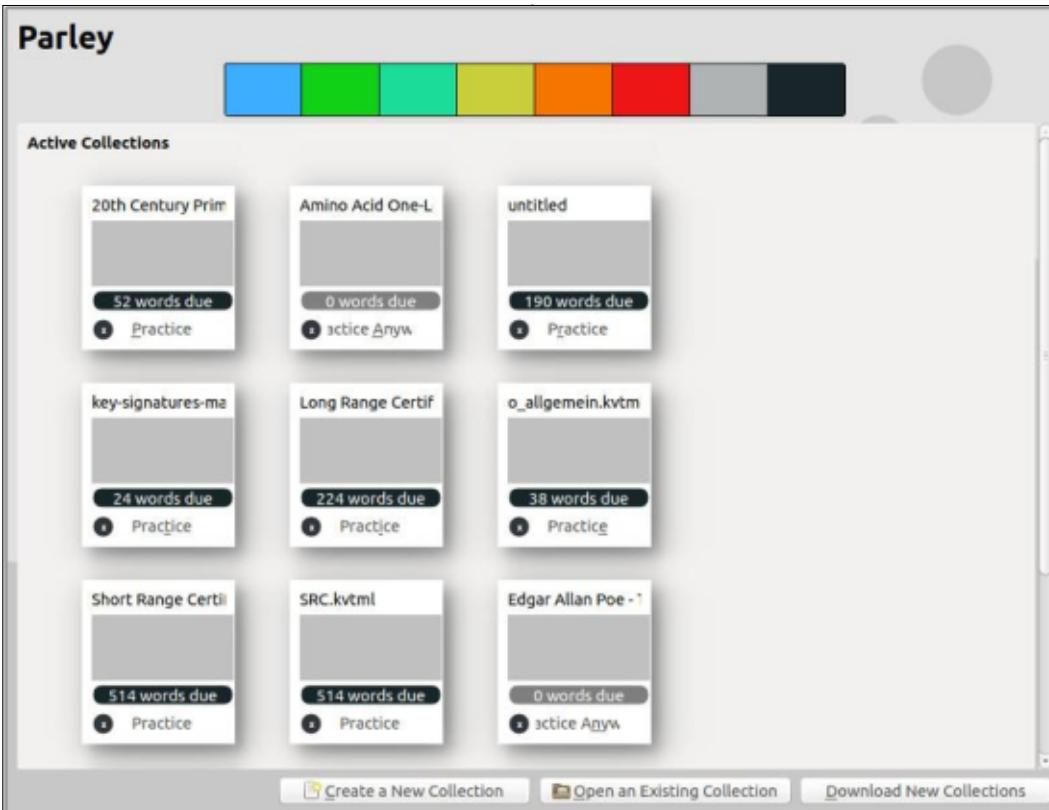


that means Parley (a quiz/flashcard application), KRecipes (exactly what it sounds like – we'll talk about it more in a later column), Kalzium for the periodic table of the elements (anyone else know Tom Lehrer's "The Element Song" by heart?), GoldenDict as a dictionary program, KDE Marble and KGeography for geography reference, and Kig as a geometry program. Education and reference software is, to me, a great use of the computer that I feel has fallen somewhat by the wayside as the

years have gone by, but Linux has some pretty good options in that respect. There are a lot of existing modules for Parley to quiz you on a wide variety of subjects including history, language, science, and others. After populating it with some of the available content, Parley looks like that shown below.

Another great use of the computer is for keeping track of financial information, and you have multiple options here, too. I am aware of GnuCash, Skrooge, and

## Parley



KMyMoney as personal finance managers. I don't have a lot of specific input here, though, as my financial accounting is actually quite basic and straightforward (it's that way when you've got little/no money, I guess).

KMyMoney does seem to have a nice, simple interface that I do like. And it does import from Quicken or Microsoft Money, among others. My bank's online component lets me export in Quicken format, so that makes coordination with KMyMoney really simple.

Another essential category is E-Book and graphics viewers. Many users will want to read PDF files on the computer, and Linux has a number of choices for that. I personally love having E-Books on my machine, especially on the Lifebook, as it can be converted to tablet/portrait mode for an excellent book reading experience. I also have a lot of my comic book collection scanned into electronic format (CBR and/or CBZ), for which I usually use Comix as a viewer. Okular is my personal choice for PDF reading, but there are many other PDF viewers available. My personal reading needs are pretty straightforward and Okular works fine (for that matter, Chrome is a

perfectly usable PDF viewer). Okular opens a wide range of file formats, beyond just E-Books.

These applications, and similar alternatives that are available, should provide users with a very useful and fairly complete set of programs for most everyday computing needs.

Next time: System Settings, and customizing the Unity Desktop.

I invite feedback on easier/better ways to do things. Any such submissions in response to articles or content will be considered the property of Full Circle Magazine for publication purposes, without remuneration, unless the writer/commenter specifies otherwise. That said, commentary and feedback are heartily encouraged and appreciated, at [acer11kubuntu@gmail.com](mailto:acer11kubuntu@gmail.com).



**Richard 'Flash' Adams** spent about 20 years in corporate IT. He lives in rural northwest Georgia, USA, with his adopted 'son', a cockatiel named Baby.



# LINUX LAB

Written by Paul Romano

**WARNING:** This is not something to try on your daily driver or on any system with valuable data. Rather use a non-critical system or at least a spare hard drive.

I had done several multi-boot setups using Linux before this, both with and without Windows. All of these booted using the traditional legacy BIOS and a MBR (ms-dos) partitioning scheme on the hard disk. If I remember correctly, the most was only four distros. I decided it was time to get up-to-date using UEFI booting and GPT partitioning. My original idea was to use the top ten distros as listed on Distrowatch. However, I decided to modify this as I specifically wanted to include 'Linux From Scratch' and a BSD variant. I tried both FreeBSD and GhostBSD, but I wasn't happy with the way they installed and decided not to complicate this article with either of them. If any readers are also BSD fans, I haven't given up on them and am trying them on a separate hard disk. I excluded Linux Mint from the list as I was already using this as my main

distro on another desktop system. Manjaro and Antergos were dropped as I wanted to try Arch for the first time, but then I found out that Arch needs an internet connection during installation which was not an option for me. So BSD and Arch were replaced by Slackware and Ubuntu MATE which I had on hand. It may be prudent to select only one Ubuntu-based distro as they can overwrite one another's menu entries.

## CREATE PARTITIONS

Once you have chosen what distros you want to install, decide what order (if any) you would like to see them in on your final GRUB menu. This determines which distro goes on which partition. Full Circle being a magazine about the Ubuntu family, I naturally chose Ubuntu as my primary distro, controlling the GRUB menu, and appearing first. After that, the distros appear in order by partition number, but if you go to extremes like me, note that partitions sdX10 and above will appear before any partitions with single numbers

below 10.

Don't forget to first backup any files you might want to keep. Booting from a Live USB containing Ubuntu 17.10, I opened GParted and created a new partition table of type "gpt" on my hard drive, effectively wiping any data on the drive. I then proceeded to create 13 new partitions, all set by default as "Primary Partition". The size of

/dev/sda1 was set at 512 MiB and formatted as FAT32. The next 11 partitions (/dev/sda2 through /dev/sda12) were all sized at 20480 MiB (20 GiB), and formatted as ext4 with the exception of /dev/sda3. This was formatted as a swap partition. The remaining space on the hard drive (/dev/sda13) was set as ext4 and labelled as "common". This was reserved for holding user files to

GParted Edit View Device Partition Help

/dev/sda - GParted

/dev/sda (465.76 GiB)

Partition	File System	Label	Size	Used	Unused	Flags
/dev/sda1	fat32		512.00 MiB	34.33 MiB	477.67 MiB	boot, esp
/dev/sda2	ext4	boot	512.00 MiB	305.20 MiB	206.80 MiB	
/dev/sda3	linux-swap	swap	20.00 GiB	0.00 B	20.00 GiB	
/dev/sda4	ext4	ubuntu	20.00 GiB	3.50 GiB	16.50 GiB	
/dev/sda5	ext4	opensuse	20.00 GiB	5.75 GiB	14.25 GiB	
/dev/sda6	ext4	slackware	20.00 GiB	9.48 GiB	10.52 GiB	
/dev/sda7	ext4	solus	20.00 GiB	4.69 GiB	15.31 GiB	
/dev/sda8	ext4	ubuntu-mate	20.00 GiB	4.31 GiB	15.69 GiB	
/dev/sda9	ext4	zorin	20.00 GiB	5.48 GiB	14.52 GiB	
/dev/sda10	ext4	debian	20.00 GiB	7.68 GiB	12.32 GiB	
/dev/sda11	ext4	elementary	20.00 GiB	3.81 GiB	16.19 GiB	
/dev/sda12	ext4	fedora	20.00 GiB	4.73 GiB	15.27 GiB	
/dev/sda13	ext4	lfs	20.00 GiB	3.24 GiB	16.76 GiB	
/dev/sda14	ext4	common	244.76 GiB	4.90 GiB	239.86 GiB	

0 operations pending



be accessed from any of the 10 distros. After applying the changes, I went back to sda1 and changed the flag to esp, which deleted the previous msftdata flag and also added a boot flag.

I chose 20 GiB as the partition size for each distro as this should be adequate to hold the base installations and allow for additional software to be installed. Remember user files are being stored on a separate partition. I know 20 GiB is probably overkill for a swap partition, but I didn't know beforehand what the requirements of each of the 10 distros were. If they needed a swap partition, what size should I use? Some distros including Ubuntu now use a swap file by default (rather than a partition), but will use a swap partition if one already exists.. If I later needed to move partitions around, a swap partition of the same size as the distro partitions might also make things easier.

## INSTALLING DISTROS

Now you can start installing all your chosen distros. It shouldn't matter in what order you install

them. I went with alphabetical, and so started with Debian on sda10. I would suggest you write down which distro goes on which partition so you can refer to it later. I did decide to leave the primary distro (Ubuntu for me) until last so that it would end up in control of the GRUB menu. I would also suggest you install all the distros before logging into any of them. See post-installation configuration below. After I downloaded the .iso file for each distro, I burnt the image to a USB stick. I used the dd command, but you can also use the Startup Disk Creator in Ubuntu. So, after you have finished partitioning, reboot with a Live ISO of your first distro.

Make sure you boot each distro/installer in UEFI mode. Usually this can be achieved by pressing F8, F11 or F12 during the boot sequence to get a UEFI Boot Menu. Select the option for your live media that begins with UEFI. Start the installer, and when you reach the partitioning stage, select "Something else" or "Manual Partitioning". Do not use automatic or guided installation. The EFI System Partition on sda1 should automatically be used without explicit selection. Make sure it will

sda1	ESP	
sda2	Ubuntu 17.10	15 min
sda3	swap	
sda4	Linux From Scratch 8.1	6 min
sda5	openSuSE 42.3 Leap	20 min
sda6	Slackware 14.2	16 min
sda7	Solus 3 Budgie	6 min
sda8	Ubuntu-Mate 17.04	16 min
sda9	Zorin 12.2 Core	15 min
sda10	Debian 9.2 KDE	14 min
sda11	elementary 0.4.1 Loki	12 min
sda12	Fedora Workstation 26	15 min
sda13	common	

not be reformatted. Confirm sda3 as the swap partition. Check your reference list and mount the desired partition (sda2-sda12) for each distro as "/" (slash) – that is as the file system root.

If you can, choose not to install a bootloader/GRUB, except of course for your primary distro, where it should be installed to /dev/sda. For all of the 10 distros, I used the same username and password, just to make it easier to remember when logging in. My list of partitions is shown above.

## INSTALLATION COMMENTS

The times it took me to install each distro using USB 2.0 sticks are given as a guide in the table above. This does not include the time

taken to download .iso files and to create LiveUSBs from those same files. It also does not include time for reading installation guides and manuals. As they say, your mileage may vary.

## DEBIAN 9.2 KDE

I tried both the graphical and text-based installers. Both are very different from the Ubiquity one used by Ubuntu and its flavours/derivatives. There are a lot more steps and questions, but they are easy to follow. By default GRUB is taken over.

## ELEMENTARY 0.4.1 LOKI

Nothing worthy of comment.

## FEDORA WORKSTATION 26



Again the Fedora installer is very different to Ubiquity. I suggest you download the Installation Guide for more information. It is possible to install without GRUB. Fedora Workstation 27 is now available.

## LINUX FROM SCRATCH

I described how to do this in a previous article (see FCM#120, April 2017, page 50). Since then, LFS has been updated to version 8.1. The install time in the table above is how long it took to restore a backup image to the partition using Clonezilla. The actual time it took to create and compile a fully working LFS system was about 1.5 days. I have already installed many additional packages from the BLFS book, and I intend to take it further by installing X-Windows and KDE, but that is still work-in-progress. I didn't need to install GRUB for LFS as it can be booted from the GRUB menu of the primary distro. On the LFS website, there is a hint document which goes into great detail about booting a stand-alone installation of LFS using UEFI.

## OPENSuSE 42.3 LEAP

Beware! OpenSuSE .iso files can be very large. The one I chose was 4.6 GB and installed some 2196 packages. It is possible to install without GRUB.

## SLACKWARE 14.2

Slackware is a distro that is, by design, conservative in its choice of software. For example, it still uses KDE4. There are no Live disc images, only ones for the installer. The installer image boots using GRUB2, but this is not available for the installed distro itself. By default, ELILO is used instead, with an option to create an entry in the UEFI boot menu. The original LILO can also be installed. The installer is ncurses-based but is easy to follow. Lots of documentation is available in the installer .iso file and also on the website. The 64-bit installer image is 2.8 GB and includes much more than the usual choice of software. Apart from KDE4, you can also choose from xfce, fluxbox, blackbox, wmaker, fvwm2, and Tab Window Manager desktops. A full installation uses about 10.6 GB (9.88 GiB).

## SOLUS 3 BUDGIE

This one threw me for a bit. Luckily, the installer is easily the quickest at under 6 minutes. After installing, if you reboot into your primary distro (Ubuntu in my case), and run sudo update-grub, Solus(3) is detected, but it does not get added to the GRUB menu. Only after some digging around in the Solus forums did I realise that to boot Solus you have to select the option to boot from another device/disc (i.e the UEFI boot menu - F8 on my system), and then select Linux Boot Manager. If desired, you can add a custom entry to the GRUB menu: In your primary distro, as root, cd to /etc/grub.d. Then, edit the file 40\_custom by appending the following lines (do not delete the first two lines):

```
menuentry "Solus 3 Budgie" {
    insmod part_gpt
    insmod fat
    set root="hd1,gpt1"
    chainloader /EFI/goofiboot/goofibootx64.efi
}
```

Note the root (hd1) should point to the correct hard disk, and gpt1 should point to your EEE System Partition (e.g. sda1). Then

run sudo update-grub to add the custom entry to your GRUB menu.

## UBUNTU-MATE 17.04

Installs similar to Ubuntu. Takes over GRUB.

## ZORIN 12.2 CORE

Installs similar to Ubuntu. Takes over GRUB.

## UBUNTU 17.10

What needs to be said? Try the new Gnome-based desktop that has replaced Unity. On my system, Wayland was used by default with no discernible effects, as it should be.

After I had finished all the installations, I rebooted once more from my LiveUSB (Ubuntu) and opened GParted. I labelled each partition with the name of the relevant distro to make it easier to find my way around later on. See screenshot.

## POST-INSTALLATION CONFIGURATION

At last. You can now remove all live media and reboot your system. If all has gone well it will boot into the distro you installed last (i.e. your primary distro [ubuntu]). If not, you will probably get a GRUB menu that will allow you to choose your primary distro.

## SWAP PARTITIONS

If you were impatient and logged into some of your newly installed distros before all the installations were completed, you may have experienced some slow boot-ups. This is caused when the distro can not find the swap partition as listed in /etc/fstab. For some reason, although the various installers all seem to recognise an already existing swap partition, most of them go on to reformat it, changing the UUID of the partition in the process. This can be remedied by updating the fstab files to show the swap partition by device name (e.g. /dev/sda3), by label (e.g. swap), or the best method, by the current UUID of the swap partition. I did this in conjunction with the next section. The UUID can be found by running sudo blkid in a terminal.

## MOUNTING THE “COMMON” PARTITION

In each distro, you need to create a mount point for the common partition. First, in a terminal in your primary distro, use the command sudo mkdir -pv /mnt/common. Then, still as root, edit the /etc/fstab file. If necessary, correct the line containing the swap partition as described in the previous section. Add an additional line for the common partition similar to:

```
UUID=0400f1d8-651c-4e8a-baab-db25e9f8e34d /mnt/common ext4 defaults, noatime 0 0
```

Use the command mount -av to mount the common partition immediately. These commands will need to be repeated later for each distro.

Still in your primary distro, and using your own username, enter:

```
sudo mkdir -pv /mnt/common/paul/{Documents, Downloads, Pictures, Music, Videos}.
```

Then:

```
sudo chown paul: /mnt/common/paul/*.
```

This needs to be done only once.

In each distro, delete the Documents, Downloads, Pictures, Music, Videos sub-folders in your home directory. Then create links to the common folders using ln -sv /mnt/common/paul/Documents /home/paul/Documents. Repeat this link creation for the other sub-folders you created earlier. In each distro, check your user ID (UID) using the command id. Normally, if you are the first user on the system (the administration user as opposed to the root user), you will have a UID of 1000. However some distros start human user UIDs from 500. If all the UIDs are the same, you will be able to access the user files stored in the “common” partition from all of the distros. I put sample files into each of the common folders, and checked that I could access them from each distro.

## CHECKING BOOT MODE

If you want to double-check how your system has booted, enter

the command ls /sys/firmware/efi. If the directory exists and has files in it, you have successfully booted in UEFI mode.

## CONCLUSION

Congratulations if you have got this far! Well done. Now all you have to do is configure each of your newly installed distros to your heart’s content. Enjoy!



**Paul** is a retired automotive manufacturing engineer. Apart from cars and computers, his other main interest is aviation. His first computer was a Sinclair ZX81 which he still uses on rare occasions. Originally from London, he now lives in South Africa. He can be reached at [paulromano@vodamail.co.za](mailto:paulromano@vodamail.co.za)



# MY STORY

Written by Paolo Pelloni

Part 1

Welcome to these few articles where I share how I tackled and solved a problem using a little of my past knowledge and leveraging the marvellous open source world. In other words, I had an issue with a piece of software (rhythmbox) and addressed it by writing a little program.

Why have I decided to write this? Open source communities are about giving back, and I believe this is a way for me to give back, not only to the Ubuntu community, but also to Full Circle, that, as you will see, has a lot of credit in this. After you read this, I hope you'll be even more enthusiastic about the possibilities that OSS offers, and maybe give it a go, try doing something yourself (it shouldn't necessarily be coding).

What you will not find in these pages is how to learn to program, or a quick course on Python, also because there's already a superb column by Greg D. Walters. I will use my program to tell my story, and to share some specific tips that show why open source is

called "open" and why that is a benefit for everyone. You don't have to be a coder or a geek to enjoy it. I know how to write a program because that was my job 30 years ago; since then I moved into a different field. When I wrote the piece of software I am sharing, I had no technical knowledge of writing code for Linux and Gnome, and didn't know Python at all.

So here is my story. I switched to Linux 12 years ago, a bit for curiosity and a bit because I was fed up with the idiosyncrasies of Windows (XP at the time): getting slow, and every six months format and reinstall to clean up the system. I started with Fedora Stentz, upgraded to Bordeaux, and then moved to Ubuntu.

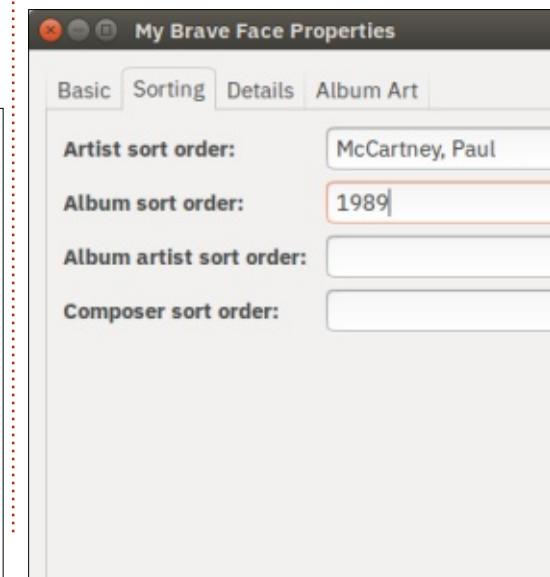
I don't remember when I stopped dual-booting, probably 6 years ago when I realised I was doing everything in Linux and never using any other OS. Like many, one of the things I do with my computer is listening to music; as a matter of fact, I'm writing this with the rhythm of Beautiful Day

from U2! In those years, I tried a few music players but I tended to stick with the default one provided by Canonical. Thus, for a little while I used Banshee, but mainly Rhythmbox which is described as "a reliable, dependable, and extensible GTK music player that uses the Gstreamer backend".

It definitely satisfied my needs and ticked all the boxes for me. I had only one little issue: sorting. It is a nice feature that offers you the possibility of showing artists and albums in a different order from the mere alphabetical one. It does that by adding more fields to the standard MP3 ones: artist sort order, album sort order,

Artist
Pentatonix (8)
People Under The Stairs (1)
Pepsi & Shirlie (1)
Belle Perez (16)
Carl Perkins (1)
Katy Perry (43)
Oscar Peterson (17)
<b>The Oscar Peterson Trio (11)</b>
Pet Shop Boys (231)

album/artist sort order, and composer sort order – see the illustration. I wanted to use this approach, so that, for example, 'The Script' would show up under 'S' and not 'T'. To do so, I just need to populate the proper field (artist sort order) with "Script, The" and so I did. It worked exactly as I wanted. You can see the result in the illustration. My next step was to sort all the albums for an artist in a chronological order – to achieve this, I simply put the year of release in the album sort order field. Of course this is how I would like to see my music, you may want it completely different.



There were only two issues. First of all, I had to enter all of this information for every track, albeit using multiple selection helps, it is still a time consuming process. Second, at times the information was lost... after I closed Rhythmbox and relaunched it, some tracks had the sort fields blank. I believed it was a bug, but a search on internet showed I was the only one suffering so I was undecided what to do. I could have lived well without sorting the information, but at the same time it was a pity. Being a former programmer and user of the Rhythmbox OSS, I took a look at the source code of Rhythmbox to see if I could tinker with it. I found it too complicated for me, I had to understand too many new concepts (Gnome, Gtk, data structures), and soon discovered it was too much for me.

I have read Full Circle since the first issue, and I noticed the Python column by Greg – that gave me the idea to try to learn Python, solve my issue, and possibly offer the community a piece of software that made it easier to enter sort information. This for me is the spirit of OSS, and during the

course of this article, we'll see why the same thing would have been way more difficult in a closed source environment.

I went straight to Greg's lesson number 1 and tried to practice a little with the classic "Hello World" program. In a short time, I started addressing my sorting problem and began writing my first program in Python. I called it fixrhy and tried to figure out how Rhythmbox uses the sort information. Looking at the documentation (<https://developer.gnome.org/rhythmbox/stable/RhythmDB.html>), I saw there is an "Object" that provides access to the song DB. Again, it proved to be a little too much to chew on at the time and therefore I decided to go along a different road. I discovered that the information is saved in a XML file, so I tried to play with it. Before the next chapter, where I talk about my first program, I would like to point out that the route I took is not the ideal one. Writing a plugin and using the official API would have been more appropriate and future-proof. But, at the time, I just wanted to try Python and come up with a quick fix, and so I did.



## FULL CIRCLE 2018 SURVEY

**It's that time of the year again where we ask what you think of FCM, Ubuntu, and Linux.**

Some questions are a requirement, some you can skip over if not applicable.

Your answers will help shape Full Circle, so please use your constructive criticism. If you don't tell us what you think, or what we're doing wrong, then we won't know.

**Survey URL:**  
<http://bit.ly/fcm2018>

## FULL CIRCLE WEEKLY NEWS



## Full Circle Weekly News

Join our new hosts Wayne and Joe as they present you with a short podcast (<10min) with just the news. No chit-chat. No time wasting. Just the latest FOSS/Linux/ Ubuntu news.

**RSS:**  
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AUDIO MP3

# MY OPINION

Written by SJ Webb

We know the dominance of Windows and the “alternative mac OS,” as perceived by the world. Yet there is a fringe population that uses BSD or Linux. I use Fedora or Ubuntu-based operating systems on a daily basis. When I started using Linux, I briefly heard whispers of BSD on forums and articles. Finally, after becoming moderately confident in my understanding of the command-line, I ventured into the BSD realms. I downloaded the major and minor BSD variants. Yet I could not install the OS to a Lenovo SL500, due to bootloader issues. So I left BSD off to the side and deepened my understanding of Linux.

However, a few months later I needed to completely clean some hard drives, so I purchased the PartedMagic iso. I burned the iso to a USB drive successfully. I booted the Lenovo from the Partedmagic thumb drive, and flawlessly erased the SATA drive.

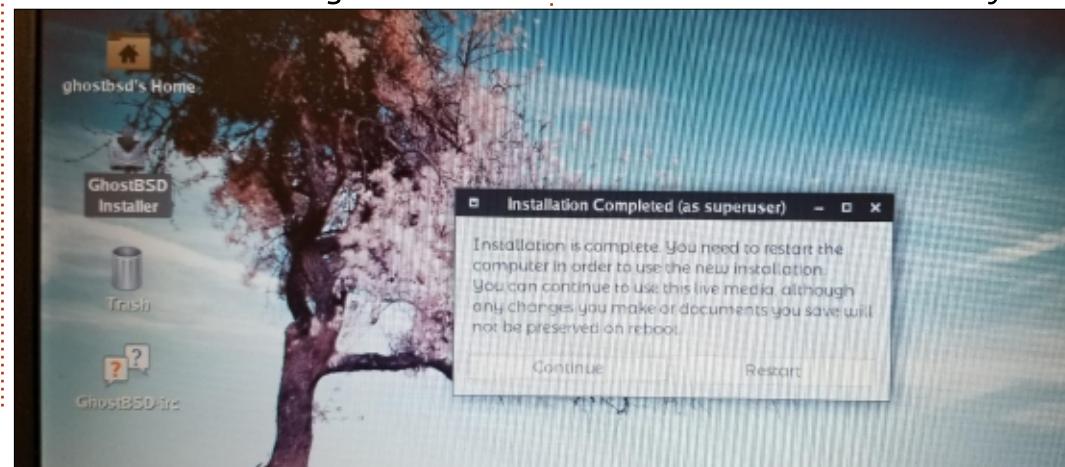
My first attempt for BSD installation was True OS. True OS

installed easily, but the only available DE is Lumina. It is a homebrew project by the developers. Overall, I could navigate and use the operating system on the Lenovo. However, the DE felt like an unfinished product, and there were no other DEs available. It is true I can choose XFCE from their App Cafe, however it seemed rather redundant. Why install Ubuntu Gnome, and then have XFCE installed? I firmly believe that secondary DE sessions lack the core skills of any primary DE. So I scrapped the idea of using True OS – perhaps, in time, Lumina might become refined.

I created a bootable GhostBSD thumb drive and I began to see the

attractiveness of BSD. I choose the MATE desktop since I am well versed with the DE.

TrueOS and GhostBSD are based off FreeBSD. FreeBSD is the most popular version of BSD. I easily updated the system and began installing the programs I use. At home, the laptop worked well. I had no problems with it. However, the laptop was difficult in a work setting. The BSD laptop would connect to any open WiFi. However it was difficult to manipulate the network manager to choose the correct WiFi Connection when it left my house. You could change the settings via the command line. Eventually I



# BSD vs Linux

replaced GhostBSD with Lubuntu. The laptop is now used by my kids for school work.

I have a bittersweet taste using BSD. I wanted to like BSD, but I could not get over the little inadequacies. As a result I will not be using BSD in the future.

A BSD criticism is that Linux is just a kernel, but BSD is the whole operating system. I can understand this viewpoint to a certain degree. Linux is just a kernel, but companies like Red Hat, Canonical and SUSE fill in the rest of the OS immaculately for the common user. The BSD community does not offer a nicely packaged whole OS, at least on two different FreeBSD variants. If it offered a true alternative to Linux, then I would be writing this paper on a BSD workstation and not a Korora OS laptop.

If you truly want a positive BSD experience, I suggest using GhostBSD. TrueOS will be a great project once Lumina DE is matured.



## GUIDELINES

The single rule for an article is that it must somehow be linked to Ubuntu or one of the many derivatives of Ubuntu (Kubuntu, Xubuntu, Lubuntu, etc).

## RULES

- There is no word limit for articles, but be advised that long articles may be split across several issues.

- For advice, please refer to the **Official Full Circle Style Guide:**  
<http://url.fullcirclemagazine.org/75d471>

- Write your article in whichever software you choose, I would recommend LibreOffice, but most importantly - **PLEASE SPELL AND GRAMMAR CHECK IT!**

- In your article, please indicate where you would like a particular image to be placed by indicating the image name in a new paragraph or by embedding the image in the ODT (Open Office)

document.

- Images should be JPG, no wider than 800 pixels, and use low compression.
- Do not use tables or any type of **bold** or *italic* formatting.

If you are writing a review, please follow these guidelines :

When you are ready to submit your article please email it to:  
[articles@fullcirclemagazine.org](mailto:articles@fullcirclemagazine.org)

## TRANSLATIONS

If you would like to translate Full Circle into your native language please send an email to [ronnie@fullcirclemagazine.org](mailto:ronnie@fullcirclemagazine.org) and we will either put you in touch with an existing team, or give you access to the raw text to translate from. With a completed PDF, you will be able to upload your file to the main Full Circle site.

# Write For Full Circle Magazine

## REVIEWS

### GAMES/APPLICATIONS

When reviewing games/applications please state clearly:

- title of the game
- who makes the game
- is it free, or a paid download?
- where to get it from (give download/homepage URL)
- is it Linux native, or did you use Wine?
- your marks out of five
- a summary with positive and negative points

### HARDWARE

When reviewing hardware please state clearly:

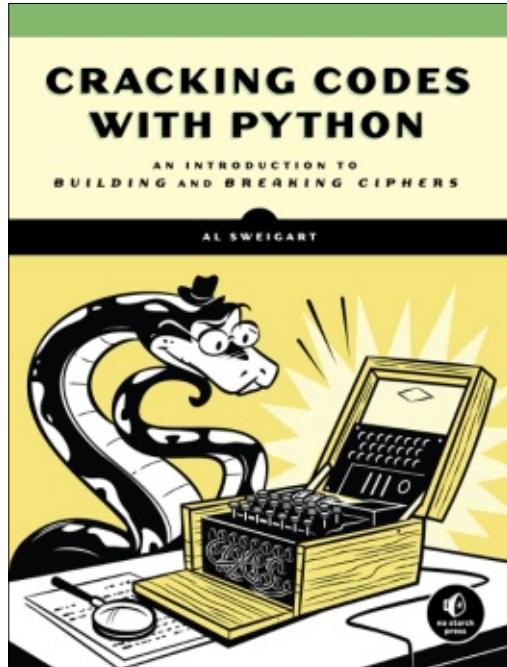
- make and model of the hardware
- what category would you put this hardware into?
- any glitches that you may have had while using the hardware?
- easy to get the hardware working in Linux?
- did you have to use Windows drivers?
- marks out of five
- a summary with positive and negative points

You don't need to be an expert to write an article - write about the games, applications and hardware that you use every day.



# BOOK REVIEW

Written by Greg Walters



## Cracking Codes with Python An Introduction to Building and Breaking Ciphers

Author: Al Sweigart

Publisher: No Starch Press

ISBN: 978-1-59327-822-9

Price: \$29.95 US

424 pp.

Published January 2018

**W**hen I was a kid, I was extremely interested in secret codes, as were most young boys. It always seemed cool to be

able to send messages to my friends that only we could read. In those days, there were secret decoder rings that were available with box tops from various companies whose products always seemed to be in our homes.

Today, we don't have to spend, what seemed like forever, collecting pieces of cardboard, sending them to a company a zillion miles away, and then waiting for an even longer eternity, daily checking the mailbox for a package containing our special prize. The fact that the secret decoder ring that finally came was a piece of cheap plastic – that broke after a few months, if even that long – didn't dampen our enthusiasm. We felt like we finally had a way to be like actual secret agents with our own codes that no one, absolutely no one, could break.

Today, Al Sweigart has given us our own secret decoder ring on our own computers – that won't break in a few months, and makes the process of creating those secret messages so much easier.

# Cracking Codes With Python

## Table of Contents

- Making Paper Cryptography Tools
- Programming in the Interactive Shell
- Strings and Writing Programs
- The Reverse Cipher
- The Caesar Cipher
- Hacking the Caesar Cipher with Brute-Force
- Encrypting With The Transposition Cipher
- Decrypting With The Transposition Cipher
- Programming a Program To Test Your Program
- Encrypting and Decrypting Files
- Detecting English Programmatically
- Hacking The Transposition Cipher
- A Modular Arithmetic Module for the Affine Cipher
- Programming the Affine Cipher
- Hacking the Affine Cipher
- Programming the Simple Substitution Cipher
- Hacking the Simple Substitution Cipher
- Programming The Vigenere Cipher
- Frequency Analysis
- Hacking the Vigenere Cipher
- The One-Time Pad Cipher
- Finding and Generating Prime Numbers
- Generating Keys for the Public Key Cipher
- Programming the Public Key Cipher



I thoroughly enjoyed Cracking Codes With Python and give it five stars.





# LETTERS

## ENCRYPTION

Your last edition (FCM#131) gave instructions on how to fully encrypt the entire drive rather than just the home partition, by using VeraCrypt.

Last year, I wondered whether one could replace VeraCrypt with LUKS, bearing in mind that Linux appears to natively support LUKS.

I attempted to do just this. After much help from others, I succeeded. This process encrypts both Linux and Grub — but not the very initial boot, for obvious reasons. (This unavoidable unencrypted initial point leaves open a tiny vulnerability.) The process requires UEFI on the machine.

For those who might find this interesting, I created the documentation on Ubuntu's Community Help:  
<https://help.ubuntu.com/community/ManualFullSystemEncryption>

Unfortunately, some issues

If you would like to submit a letter for publication, compliment or complaint, please email it to: [letters@fullcirclemagazine.org](mailto:letters@fullcirclemagazine.org).  
 PLEASE NOTE: some letters may be edited for space.

make the process unsuitable for any but the most determined, and certainly not for the newbie. The most important follow.

- Grub and Ubuntu don't support this natively, making the installation process lengthy and manual. Easy, but long and fiddly.
- After a kernel update, you need to redo a small part of the installation (as documented in the Troubleshooting guide). Quick and easy, true, but irritating and easy to forget to do.
- Being unsupported, the instructions for new versions of Ubuntu might need revamping. It also means that the process for Ubuntu variants, such as Lubuntu, has some (minor) differences.
- The process encrypts only Linux, not Windows or any other distribution.

It might work far better (only on a modern machine because of extra required resources) to use a hypervisor such as Xen or KVM (so I understand), which in turn contains Windows, Ubuntu, Mac, and whatever other operating system you might need. By

encrypting the hypervisor rather than the contained operating systems, this would simplify the encryption process dramatically. Unfortunately, I do not have the knowledge to do such a thing. (I hope that some enterprising reader has the skills to do this and to document it, thereby rendering my own discoveries excitingly redundant!)

I feel that Ubuntu should support full-disk encryption out of the box, especially given all the security concerns these days.

Even better than that, the computer manufacturer should support hardware-level encryption, eliminating the need to do this at all via software. It would also eliminate the initial unencrypted point that the software method requires. I hope that this happens soon.

In the meantime, I guess that VeraCrypt provides the only sensible method, especially with its cross-platform support. Let's hope that the developers support

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[ubuntuforums.org/forumdisplay.php?f=270](http://ubuntuforums.org/forumdisplay.php?f=270)

## FULL CIRCLE NEEDS YOU!



Without reader input **Full Circle** would be an empty PDF file (which I don't think many people would find particularly interesting). We are always looking for articles, reviews, anything! Even small things like letters and desktop screens help fill the magazine.

See the article **Writing for Full Circle** in this issue to read our basic guidelines.

Have a look at the last page of any issue to get the details of where to send your contributions.



## LETTERS

VeraCrypt for a long time.

And, now that I'm writing this, I've just realised how to include Windows and other operating systems in the encryption, again except for the UEFI partition.

**Paddy Landau**

## CONTAINERS

Could be that you have already covered this and I have missed it (mea culpa, if so), but may I suggest you cover using containers to create flexible applications on Linux, in particular Web stacks? I got very tired of re-installing Ubuntu while building directly installed LAMP stacks as nearly identical as possible to those on various deployment hosts. I had to reinstall Ubuntu because I could not count on removing side effects left behind in the file system as I replaced one stack configuration with another. Encapsulating the LAMP components in containers prevented the problem, albeit at the cost of some added complication.

I thought I would have to work

this out for myself, but I found that someone had beaten me to it with an excellent free-software solution. See [devilbox.org](http://devilbox.org) for details.

Putting this into the form of a leading question, please ask readers how often they need to reinstall Linux because they have broken something that they do not know how to fix.

**Jeff Wilson**



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## FULL CIRCLE WEEKLY NEWS



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**AUDIO MP3**



# Q&A

Compiled by Gord Campbell

**Q** After wiping out the hard drive on my new laptop, I changed back to UEFI and reinstalled Win 10 (wiped the whole disk again) and, after all updates, reinstalled Ubuntu 17.10 as well. Since then I can't get the touchpad to work, everything else does, but the touchpad doesn't even show up in xinput since the change to UEFI.

**A** (Thanks to original poster **msbt** in the Ubuntu Forums) I was playing around for days and just now (because it wouldn't shut down properly) I edited grub with acpi=force

`sudo nano /etc/default/grub`

and put in

`GRUB_CMDLINE_LINUX_DEFAULT="acpi=force"`

After reboot the touchpad was working!

**Q** I was able to access the content of my Android phone by just plugging it into my computer, then something changed and it didn't appear in the file manager.

**A** You probably implemented a Screen Lock password. Remove the password and you should see the files on the phone.

**Q** I am in the process of building a computer. The standoffs (included with the case) would not thread into the case. I will be returning the case. Is there any danger in testing the components outside of the case while I am waiting for a new case?

**A** (Thanks to **Autodave** in the Ubuntu Forums) The biggest danger is static electricity.

The other dangers are dropping something on the motherboard or spilling some liquid on it.

If you have a Linux question, email it to: [misc@fullcirclemagazine.org](mailto:misc@fullcirclemagazine.org), and Gord will answer them in a future issue. Please include as much information as you can about your query.

**Q** I have an old machine that is running 12.04. The essentials are backed up. Would it make most sense to just install over the top with 18.04?

**A** (Thanks to **strixtux** and **kc1di** in the Ubuntu Forums.) Gord says: *switch to Xubuntu or Ubuntu Mate for this older computer.*

Try a Live USB or Live DVD to check that the computer can run a current OS. If 18.04 doesn't work, try 16.04.

Swap in a new hard drive and install onto that; you still have the old installation to work with if there's a problem. Put the old drive in an external case so you can easily copy the data files. Once you are happy with the new setup, you can use the old hard drive for backup.

**Q** How do I change the margins of a Calc spreadsheet?

**A** (Thanks to **KH** in ask.libreoffice.org) Click on Format, Page, Margins.

**Q** I want to print a chart in Calc with the grid lines showing.

**A** (Thanks to **Lupp** in ask.libreoffice.org) Choose the option under > 'Format' > 'Page...' > tab 'Sheet'.

**Q** I'm using Libreoffice 4 on Ubuntu. I'd like to export an existing .docx file to mediawiki language.

**A** (Thanks to **David** in ask.libreoffice.org) First: sudo apt install libreoffice-wiki-publisher

After a reboot, you should be able to: File > Export... select MediaWiki | txt in the File type list. Click the Save button.





# UBUNTU GAMES

Written by Ronnie Tucker

Way back in 2002, two brothers (Tarn and Zach Adams) began development on a game called Slaves to Armok: God of Blood Chapter II, or, as we know it, Dwarf Fortress. It was 2006 before the brothers released the first alpha version, and, to this day, they are still releasing updates. Even after ten years of development, they've still not hit version 1.0.

While the game is less known in the mainstream, it was the inspiration for a little game called



Minecraft. But Dwarf Fortress has a massive following, is continually updated, but is notoriously difficult to master. It has features aplenty, but its graphics are entirely ASCII.

Yes. You read that right. But there are numerous addons that will give (slightly!) better graphics and additional features. This quick article will show you how to get Dwarf Fortress loaded.

## INSTALL

The first thing you need to do is download what's called the Linux Lazy Newb Pack (or LinuxLNP for short):

<http://dfffd.bay12games.com/file.php?id=13244>

You then unarchive that to a folder on your system.

Now we need to install some dependencies:

```
sudo apt-get install default-jre libSDL1.2debian libSDL-image1.2 libSDL-ttf2.0-0 libglu1-mesa libgtk2.0-0 libopenal1 libjpeg62 wget coreutils tar xterm sed python bzip2 qtchooser libqt4-script libqt4-scripttools libqt5script5 libqt5scripttools5 libqxt-core0 libqxt-gui0
```

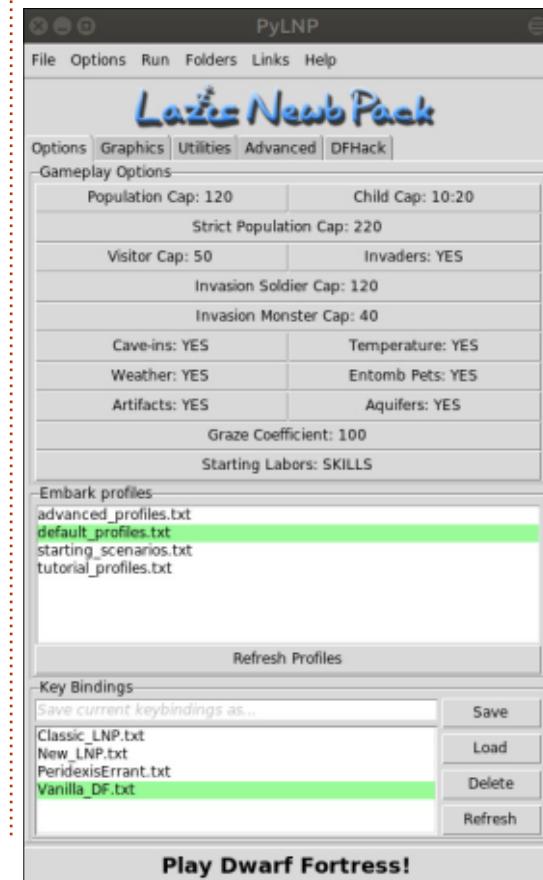
Since that's a sudo command, it will ask you for your password.

Once that's done, open the LinuxLNP folder and you'll see two folders (df\_linux, and LNP) and several files. Double left-click on the file called startlnp, or, if you're in a terminal, type:

`./startlnp`

On the first run, you may be asked which Terminal you want to use. Your default terminal should be the one already selected. So clicking OK should do you fine.

You'll soon see the Lazy Newb Pack window:



Obviously, the big 'Play Dwarf Fortress!' button will do what it says on the tin, but first it's better to add a few tweaks.

DFHack is a bunch of preinstalled addons for Dwarf Fortress, but you have to enable them first. Click the DFHacks tab at the top of the window (below the Lazy Newb Pack logo). I usually enable:

- Automatic Job Assignments
- Autoprune Dead/Missing List
- Don't Cook Tallow
- Performance Tweaks

Feel free to enable others as you see fit. If you want a more exotic isometric view of Dwarf Fortress, then to enable Stonesense.

In the **Advanced** tab, I just make sure sound is set to NO and Autosave is set to SEASONAL. The rest I leave as default.

The **Utilities** tab is a bunch of tools that you can use when you're in the game. Dwarf Therapist is excellent for tweaking the things your dwarves can/can't do. Soundsense will give you appropriate background music,

and while Armok Vision will give you a lovely Unity3D view of your fortress, it will probably slow your machine to a crawl.

The **Graphics** tab is where you can choose a 'theme' of sorts.

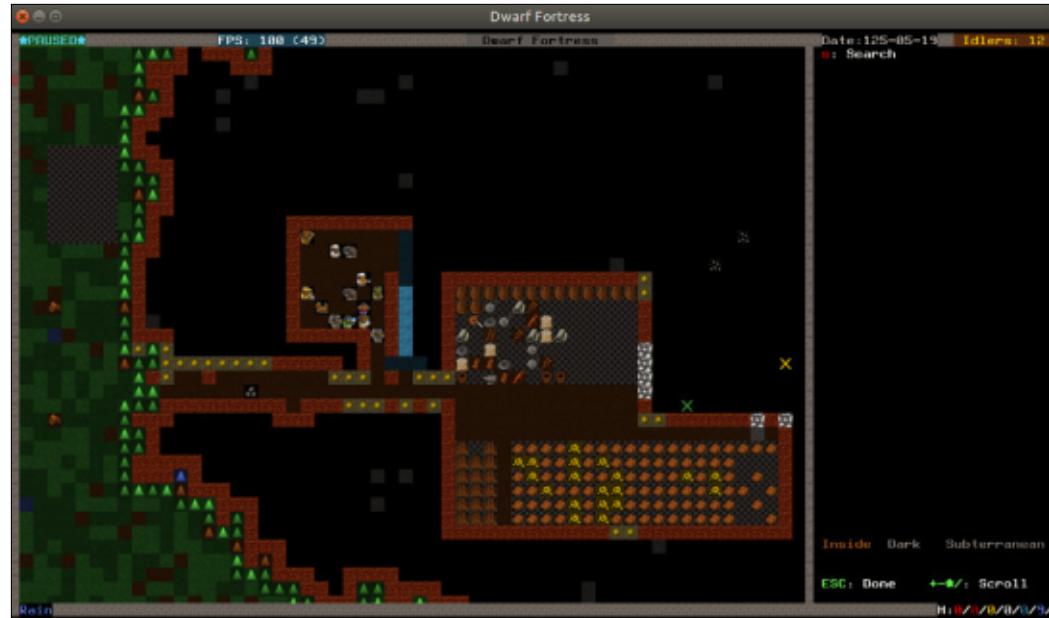
**Options** is where you can set some other options (which I left at default).

All you need to do now is click 'Play Dwarf Fortress!' and you're in!

## START SMALL

Although Dwarf Fortress may seem simple with its ASCII graphics (or theme), it's actually quite CPU

intensive. It's best to start with a small map. This game simulates every nuance of its world right down to simulating individual body parts being damaged! No, seriously. It's like a nano-world Minecraft. When you generate a world, it will make a random world, and then apply up to two hundred years of history to it. It will change the terrain accordingly and keep a log of every event that's happened in that history (eg: battles) which you can then read through. It's insane just how complex this game is under the hood.



## REFERENCES

Two good starter guides are:  
[http://dwarffortresswiki.org/index.php/DF2014:Quickstart\\_guide](http://dwarffortresswiki.org/index.php/DF2014:Quickstart_guide)

and:  
<https://df-walkthrough.readthedocs.io/en/latest/index.html>

Good luck. I'm still trying to get the hang of it!

Dwarf Fortress on Wikipedia:  
[https://en.wikipedia.org/wiki/Dwarf\\_Fortress](https://en.wikipedia.org/wiki/Dwarf_Fortress)

Dwarf Fortress' own wiki:  
<http://dwarffortresswiki.org>

LinuxLNP:  
<http://dffd.bay12games.com/file.php?id=13244>



**Ronnie** is the founder, and editor, of Full Circle. His other interest is art, and his work can be seen at:  
[ronniertucker.co.uk](http://ronniertucker.co.uk)



# PATRONS

## MONTHLY PATRONS

### 2016 - Present:

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Norman Phillips  
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Charles Battersby  
Tom Bell  
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Joao Cantinho Lopes  
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### 2017 - Present:

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Jay Pee  
Brian Kelly  
J.J. van Kampen

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Kevin O'Brien  
Kevin Raulins  
Carl Andersen  
Charles Stewart  
Dave Nelson  
Brian Bogdan

## SINGLE DONATIONS

### 2017:

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The current site was created thanks to **Lucas Westermann** (Mr. Command & Conquer) who took on the task of completely rebuilding the site, and scripts, from scratch, in his own time.

The Patreon page is to help pay the domain and hosting fees. The yearly target was quickly reached thanks to those listed on this page. The money also helps with the new mailing list that I set up.

Several people have asked for a PayPal (single donation) option, so I've added a button to the right side of the website

A big thank you to all those who've used Patreon and the PayPal button. It's a HUGE help.



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