



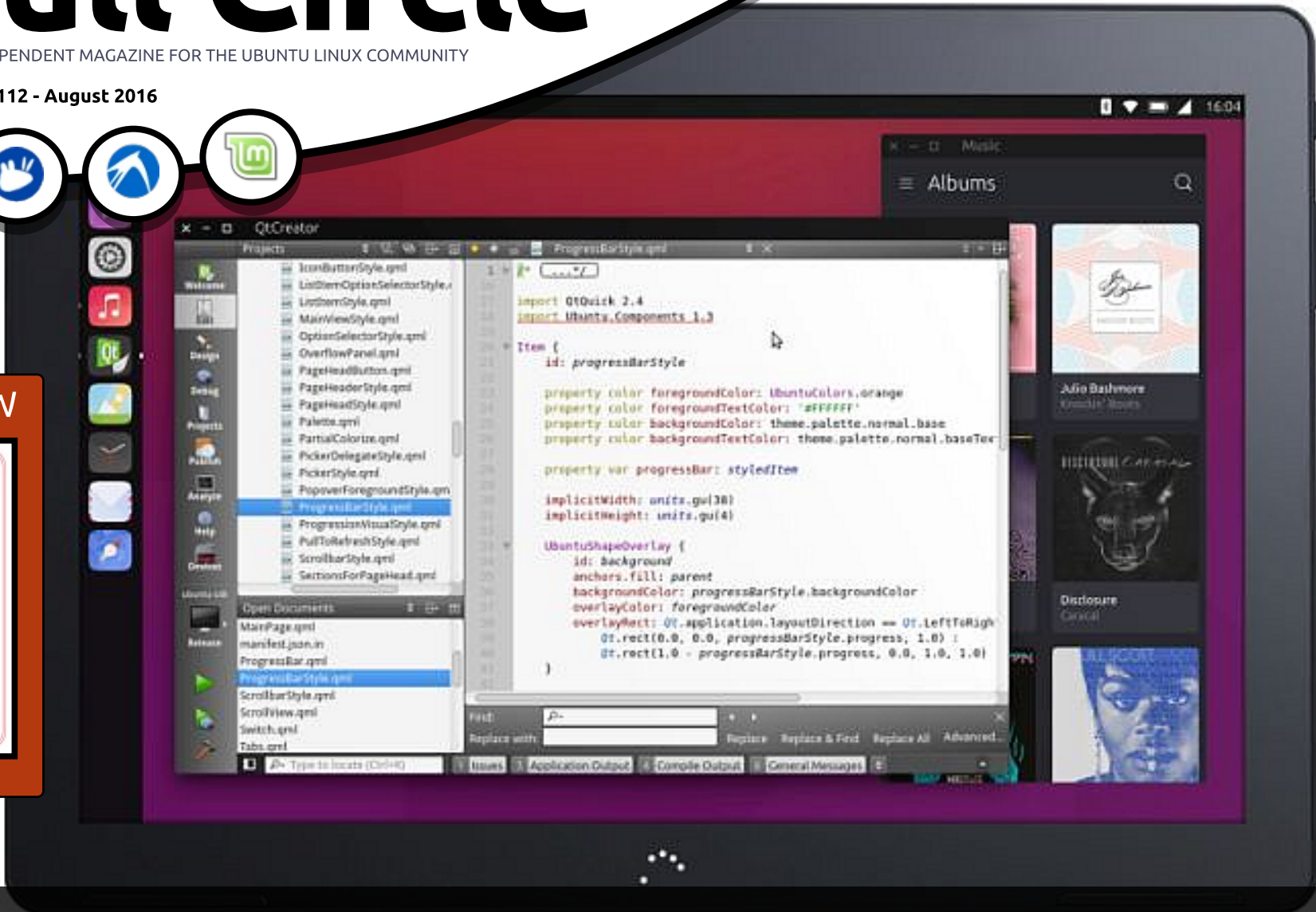
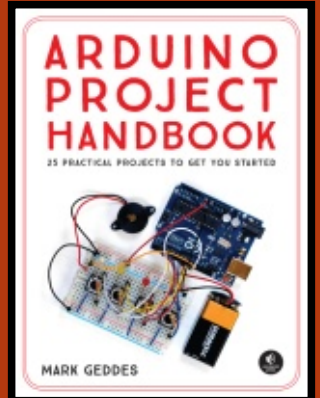
# Full Circle

THE INDEPENDENT MAGAZINE FOR THE UBUNTU LINUX COMMUNITY

ISSUE #112 - August 2016



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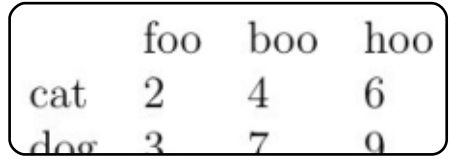
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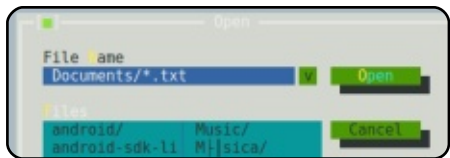
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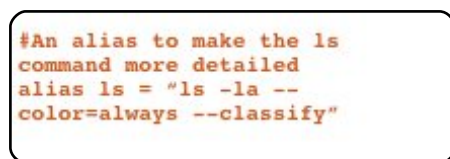


# Full Circle

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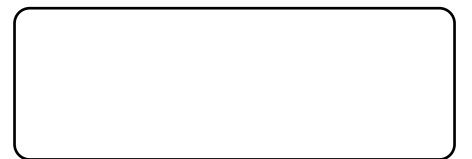
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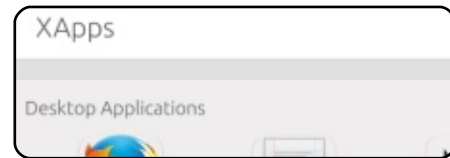
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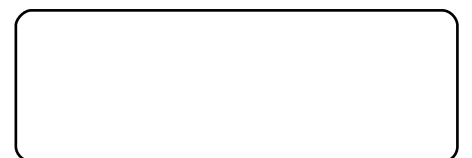
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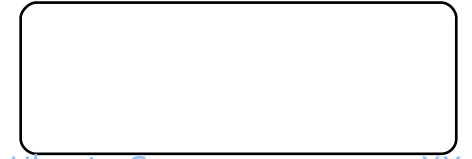
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## WELCOME TO ANOTHER ISSUE OF FULL CIRCLE.

The usual suspects are back. We have Python, LaTeX, FreePascal, and Inkscape for you this month. Add to that we have an interesting additional piece from Alan Ward discussing what exactly is in that Ubuntu ISO that you've downloaded. Also, an article on the best way to transition your business (or 'a' business) to open source software.

The big news in Ubuntu Touch is the release, last month, of OTA-12. This brings in the ability to install some X desktop apps onto certain devices. Now, like I say in my article, it's not perfect and doesn't work with every app, but I'm covering how to add a puritine container to a device then install apps in it. I managed to get MyPaint (an app I use on the desktop all the time) to install on my M10 tablet and it works perfectly.

In the middle of this month (August) I sent out an email to the mailing list asking for articles. We **REALLY** need new articles. Thank you to the few who did reply with articles and putting forward ideas that they hope to flesh out into articles. To those who haven't written anything: please consider writing a review or a HowTo. It'll help keep FCM running. Hopefully for another ten years. Yes, from April 2017, FCM will have been running for ten years. I'd like to make it a special bumper issue, but it won't be unless I can get more articles.

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

Ronnie

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## VOYAGER 16.04.1 LTS ADDS INTEL SKYLAKE SUPPORT, BASED ON XUBUNTU 16.04.1 LTS

Based on the recently announced Xubuntu 16.04.1 LTS (Xenial Xerus) operating system, Voyager 16.04.1 LTS comes with the latest and most advanced Xfce 4.12.3 desktop environments, the long-term supported Linux 4.4 kernel that includes support for Intel Skylake CPUs, and UEFI 2.5 (Unified Extensible Firmware Interface) for modern PCs.

Xfdashboard, the GNOME Shell-like dashboard for Xfce, has been updated to version 0.6, and popular open-source software projects like the Mozilla Firefox web browser, Kodi media center, and LibreOffice 5.1 office suite have been added to the new Voyager 16.04.1 LTS release.

Being based on Xubuntu 16.04.1 LTS (Xenial Xerus), the Voyager 16.04.1 LTS distribution inherits almost all of its new GNU/Linux

technologies. Voyager 16.04.1 LTS comes two months after the release of Voyager 16.04 LTS, it's available for download as 64-bit and 32-bit Live ISO images, and users are encouraged to upgrade to it as soon as possible.

Source:

<http://news.softpedia.com/news/voyager-16-04-1-lts-adds-intel-skylake-support-based-on-xubuntu-16-04-1-lts-506800.shtml>

## SEYMOUR PAPERT, A PIONEER OF ARTIFICIAL INTELLIGENCE AND KIDS CODING, HAS DIED

Being a pioneer of artificial intelligence and creating the first programming language for kids are no small feats. But it was his dedication to using technology to change the way we educate children that made Seymour Papert, who died Sunday at the age of 88, a true visionary.

"It's not like somebody who

invented C++ or some other programming language," said Michael Tempel, president of the Logo Foundation and a colleague of Papert's for 35 years. "The language is just one aspect of the whole approach to teaching and learning, and that's really the main thing."

Born in Pretoria, South Africa on February 29, 1928, Papert focused his academic pursuits on philosophy and math, earning his PhD at the University of Witwatersrand before studying at Cambridge (where he earned another PhD in 1958). During his second doctoral program, he did work at the University of Paris, where he met Jean Piaget—the father of childhood development theory. Piaget inspired Papert to combine his passion for both education and technology to find new ways to engage children.

In the 1960s, Papert joined the Massachusetts Institute of Technology, where he and Marvin Minsky co-founded the Artificial Intelligence lab and laid the

foundation for some of the earliest work in AI. Minsky and Papert co-wrote the book *Perceptrons*, considered a seminal examination of artificial neural networks—and their limitations.

Source:

<http://motherboard.vice.com/read/seymour-papert-a-pioneer-of-artificial-intelligence-and-kids-coding-has-died>

## BEAUTIFUL ARC GTK THEME NOW AVAILABLE IN THE UBUNTU 16.10 (YAKKETY YAK) REPOS

ArC GTK Theme is a flat desktop theme written with GTK+ GUI toolkit, designed specifically for use with any Linux desktop environment that's also written in GTK+, such as GNOME, Budgie, Xfce, LXDE, and others. The theme offers three different styles, namely Arc, Arc-dark, and Arc-darker, as well as transparent elements.

David Mohammed from the Ubuntu Budgie Remix project, an unofficial Ubuntu flavor built around the Budgie desktop

environment from the Solus Project, was the one to upload the Arc GTK Theme to the universal software repositories of the upcoming Ubuntu 16.10 (Yakkety Yak) operating system last month.

On August 1, 2016, the theme was rebuilt to support the latest GTK+ 3.20 GUI (Graphical User Interface) toolkit that will soon be uploaded from the upstream GNOME Stack to Ubuntu 16.10, along with various other GNOME 3.20-related packages, such as the long-anticipated Nautilus 3.20 file manager.

Source:

<http://news.softpedia.com/news/beautiful-arc-gtk-theme-now-available-in-the-ubuntu-16-10-yakkety-yak-repos-506872.shtml>

## ARCH LINUX 2016.08.01 IS NOW AVAILABLE FOR DOWNLOAD, SHIPS WITH KERNEL 4.6.4

Arch Linux 2016.08.01 is now available for download, distributed as a dual-arch, bootable ISO image that supports

installations on 64-bit and 32-bit computers and includes all the up-to-date core components that have been pushed to the distro's main software repositories since July 1.

However, Arch Linux 2016.08.01 ships with a kernel from the Linux 4.6 series, as the distribution's maintainers have not yet moved to the latest Linux 4.7 kernel branch. Linux kernel 4.6.4 powers the Arch Linux 2016.08.01 ISO image, despite that fact that the most recent release from the series is Linux kernel 4.6.5.

You don't need to download a new ISO image to achieve that. If you've run the "sudo pacman -Syu" command and installed all the available updates, then your Arch Linux operating system is up to date. The Arch Linux 2016.08.01 ISO is available only for those who want to reinstall or deploy the OS on new machines.

Source:

<http://news.softpedia.com/news/arch-linux-2016-08-01-is-now-available-for-download-ships-with-kernel-4-6-4-506865.shtml>

## ARTIFICIAL INTELLIGENCE IS KEY TO AUTONOMOUS CYBER SECURITY FUTURE

DB Networks, a leader in database cybersecurity, announced that the latest in Artificial Intelligence (AI)-based security technologies, including machine learning and behavioral analysis offered in the DB Networks DBN-6300 and Layer 7 Database Sensor, is being deployed to intelligently combat modern cyber security database threats. This is leading to a trend over the next several years where individual AI-based security systems will be integrated into organizations' comprehensive autonomous cyber security architecture. Intelligent security sensors will be deployed throughout the network to not only immediately and accurately identify security events, but also to remediate them.

The entire IT security industry is seeing a major transformation from signature-based solutions (black lists and white lists) to highly intelligent security solutions based on AI.

Source:

[http://www.toptechnews.com/article/index.php?story\\_id=0030001W20M9](http://www.toptechnews.com/article/index.php?story_id=0030001W20M9)

## ROSA DESKTOP FRESH R8 LINUX SHIPS WITH KDE 4, PLASMA 5, GNOME AND MATE FLAVORS

Based on the latest ROSA 2014.1 platform, the ROSA Desktop Fresh R8 Linux distribution ships with new flavors featuring the KDE 4, KDE Plasma 5, GNOME, and MATE desktop environments, and two years of extended support, which means that you'll receive software updates and security patches until fall 2018.

Unfortunately, ROSA Desktop Fresh R8 doesn't ship with the latest software versions and GNU/Linux technologies that are now popular amongst various distros. All four editions ship with the long-term supported Linux 4.1.25 kernel (the latest version is Linux kernel 4.1.29 LTS), but kernels from the Linux 4.4 LTS and Linux 4.6 series are installable from the main software

repositories.

Among other components included in ROSA Desktop Fresh R8, we can mention Mesa 11.2.2 3D Graphics Library, PulseAudio 8.0 sound server, NetworkManager 1.2.2 network connection manager, Chromium 51.0 and Mozilla Firefox 46.0.1 web browsers, Mozilla Thunderbird 38.6 email and news client, LibreOffice 5.1.4 office suite, Qt 5.6.1 GUI toolkit, as well as the FFmpeg 2.8.7 and GStreamer 1.6.3 multimedia frameworks.

Source:

<http://news.softpedia.com/news/rosa-desktop-fresh-r8-linux-ships-with-kde-4-plasma-5-gnome-and-mate-flavors-506913.shtml>

## UBUNTU SNAPPY CORE NOW OFFICIALLY AVAILABLE FOR UCROBOTICS' BUBBLEGUM-96 BOARD

Canonical announced that the Snappy Ubuntu Core operating system for embedded and IoT (Internet of Things) devices is now officially available for the Bubblegum-96 single-board

computer (SBC).

Designed by uCRobotics, the Bubblegum-96 board boasts an optimized Actions' s900 Quad-core ARM 64-bit Cortex-A53 processor running at 1.8GHz with a PowerVR G6230 high-quality graphics card operating at 600MHz, 2GB of DRAM, and USB 3.0 support.

uCRobotics' Bubblegum-96 SBC is one of the most powerful commercial editions from the Linaro 96Boards series and also the third Linaro single-board computer to support the Snappy Ubuntu Core operating system out of the box, a stripped-down version of the popular Ubuntu Linux designed for autonomous machines.

Source:

<http://news.softpedia.com/news/ubuntu-snappy-core-now-officially-available-for-ucrobotics-bubblegum-96-board-506947.shtml>

## TOUTOU LINUX 6.3.2 "SLAXEN" GETS SECOND ALPHA MILESTONE, BASED ON PUPPY LINUX

The developers of Toutou, a minimalist GNU/Linux distribution based on Puppy Linux, are continuing the development of the Toutou Linux 6.3.2 "SlaXen" release with a second Alpha milestone.

Toutou Linux 6.3.2 "SlaXen" will be based on the upstream Puppy Linux Slacko 6.3.2 operating system, will use the Openbox 3.5.2 window manager with the Lxpanel 0.6.1 standard panel from the LXDE desktop environment, as well as up-to-date software applications.

Being based on Puppy Linux, Toutou Linux 6.3.2 "SlaXen" will also come with support for installing packages in the PET and SFS file formats. Among the pre-installed apps, we can mention the Abiword 3.0 word processor, mtPaint 3.44.90 digital painting tool, Gnumeric 1.10.0 spreadsheet editor, and Foxit Reader 1.1 secure PDF reader.

Source:

<http://news.softpedia.com/news/toutou-linux-6-3-2-slaxen-gets-second-alpha-milestone-based-on-puppy-linux-506953.shtml>

## IBM REACHES BREAKTHROUGH IN ARTIFICIAL INTELLIGENCE

IBM has brought artificial intelligence (AI) one step closer to reality by creating technology that imitates the brain's neurons. The company's scientists have created randomly spiking neurons using phase-change materials to store and process data, which is a "significant step forward in the development of energy-efficient, ultra-dense integrated neuromorphic technologies for applications in cognitive computing," according to the company.

These artificial neurons are able to mimic the human brain in the way that they store and process data, and like an actual brain, they use little energy. Until now, achieving this has been a significant challenge for scientists.

Source:

<http://www.manmonthly.com.au/news/ibm-reaches-breakthrough-artificial-intelligence/>

## ANDROID DOMINATES INDIAN SMARTPHONE OS MARKET WITH WHOPPING 97% SHARE

Android's share of the Indian smartphone OS market jumped to a whopping 97.1% in Q2 2016, according to market research firm Strategy Analytics. The figure stood at 90% in the year-ago quarter.

In terms of smartphone units, India saw 29.8 million Android phones getting shipped in Q2. This compares to a total of 30.7 million smartphone units shipped in the country during the quarter.

Meanwhile, iOS' share of the Indian smartphone OS market almost halved, coming down to 2.4% from 4.5%. The Cupertino-based company only managed to ship 0.8 million iPhones in the country during last quarter.

Source:

[http://www.gsmarena.com/strategy\\_analytics\\_android\\_dominates\\_indian\\_smartphone\\_market\\_with\\_97\\_share-news-19811.php](http://www.gsmarena.com/strategy_analytics_android_dominates_indian_smartphone_market_with_97_share-news-19811.php)

## LUBUNTU 14.04.5 LTS ARRIVES WITH REFRESHED HARDWARE SUPPORT, MANY UPDATES

As part of the Ubuntu 14.04.5 LTS (Trusty Tahr) announcement, Lubuntu maintainer Simon Quigley has announced the release and immediate availability for download of Lubuntu 14.04.5 LTS.

Being the last maintenance update in the series, Lubuntu 14.04.5 LTS (Trusty Tahr) is here with an improved graphics stack and a new Linux kernel from the Ubuntu 16.04 LTS (Xenial Xerus) operating system, thus refreshing the hardware support and allowing users to deploy the Lubuntu distribution on newer, modern PCs.

Lubuntu 14.04.5 LTS (Trusty Tahr) is one of the few official Ubuntu flavors to support the PowerPC (PPC) hardware architecture along with the usual 64-bit (x86\_64) and 32-bit (i386) ones. The release also brings all the updated software packages that have been pushed to through the Ubuntu repos since Lubuntu

14.04.4 LTS in February 2016.

Source:

<http://news.softpedia.com/news/ubuntu-14-04-5-lts-arrives-with-refreshed-hardware-support-many-updates-507027.shtml>

## LINUX 4.8 RC1 LANDS, WITH SURFACE 3 SUPPORT PROMISED!

Linux overlord Linus Torvalds has let loose the first release candidate for version 4.8 of the Linux Kernel.

Among the changes this time around are support for several touchscreen controllers, which contributors say will mean Linux can handle Microsoft's Surface 3.

Virtualisation users will enjoy proposed support for nested virtualization on the S390 and an increase in KVM capacity to more than 255 virtual CPUs.

Torvalds has also pointed out that while progress on v 4.8 is "fairly normal ... the patch itself looks somewhat unusual: over 20% of the patch is documentation updates, due to conversion of the

drm and media documentation from docbook to the Sphinx doc format. There are other doc updates, but that's the big bulk of it."

Source:

[http://www.theregister.co.uk/2016/08/08/linux\\_48\\_rc1\\_lands\\_with\\_surface\\_3\\_support\\_promised/](http://www.theregister.co.uk/2016/08/08/linux_48_rc1_lands_with_surface_3_support_promised/)

## LINUX FOUNDATION ADOPTS OPEN VSWITCH

The Linux Foundation announced that Open vSwitch (OVS) is now a Linux Foundation Project. Open vSwitch is an open source virtual switch designed to enable network automation while supporting standard management interfaces and protocols.

In modern data centers, networking functions are increasingly performed by software running on servers, either as part of the application or within a hypervisor. While the traditional Layer-2 Linux bridge addresses many common networking tasks, Open vSwitch was created with a robust set of features and a high performance design to address the

rapidly growing needs of SDN and virtual networking use cases.

Today, OVS is used within multiple commercial products as well as large production environments. OVS has been ported to multiple virtualization platforms, switching chipsets, and networking hardware accelerators. OVS works on a wide variety of systems, including Linux, DPDK, Hyper-V, and FreeBSD. It is used in a variety of SDN applications, including NFV and network virtualization; it is the most widely used networking back-end in OpenStack.

Source:

<http://www.lightreading.com/cARRIER-sdn/sdn-technology/linux-foundation-adopts-open-vswitch/d/d-id/725308>

## MIRANTIS FORGES CLOSER TIES WITH SUSE TO PROMOTE OPENSTACK

Mirantis wants to become the "one-stop shop" for users of OpenStack on enterprise Linux. The company this week announced a new partnership with SUSE,

adding another Linux option alongside its existing Red Hat and CentOS offerings.

While Mirantis can support any Linux distribution, it has now forged closer ties with SUSE, which develops SUSE Linux Enterprise Server. On Tuesday, the companies announced a partnership that aims "to optimize SUSE Linux Enterprise Server for Mirantis OpenStack," according to a statement from Mirantis.

The companies say they will contribute the code they develop as part of their collaboration back to the main OpenStack project, making the enhancements available to the broader open source cloud community.

Source:

<http://talkincloud.com/cloud-computing/mirantis-forges-closer-ties-suse-promote-openstack>

## CANONICAL MAKES ITS UBUNTU LINUX PROFESSIONAL SUPPORT MORE ACCESSIBLE TO ANYONE

Canonical announced that the professional support subscription, namely Ubuntu Advantage (UA), is now even more accessible and easier to purchase.

Through its Ubuntu Advantage program, Canonical has provided professional support to small and medium-sized business, as well as to anyone else who has needed help to configure and use the popular Ubuntu Linux operating system on the various desktop, server, or cloud scenarios.

So, Canonical announced the launch of their new Ubuntu Advantage store via the buy.ubuntu.com domain, allowing any Ubuntu user out there to purchase or renew their UA subscription more easily. However, the service is mostly designed to help different organizations manage their Ubuntu deployments.

Source:

<http://news.softpedia.com/news/canonical-makes-its-ubuntu-linux-professional-support-more-accessible-to-anyone-507141.shtml>



## UBUNTU NOW SUPPORTS POPULAR REACT NATIVE FOR FIRST-CLASS WEBAPPS

Canonical has announced that its Ubuntu operating system will support the React Native framework, allowing for the porting of iOS or Android React Native applications to Ubuntu. Canonical says that React Native apps that are built on, or ported to Ubuntu will “react” to converged environments, meaning the app can be run on desktop, tablet or mobile.

React Native allows developers to build applications using Facebook's React.js, but provides developers with the ability to make their application feel like a first-class app, no matter what operating system it runs on, by using native user interface components directly.

Ubuntu Phone has been lacking well-known applications on its platform, which has stunted its growth. By introducing support for this framework, Canonical might be able to rope in apps from iOS and Android to Ubuntu Phone.

Source:

<https://www.neowin.net/news/ubuntu-now-supports-popular-react-native-for-first-class-webapps>

## ARCH LINUX IS NOW OFFICIALLY POWERED BY LINUX KERNEL 4.7, UPDATE YOUR SYSTEMS

Linux kernel 4.7 is the most stable and advanced kernel branch, and only a few GNU/Linux distributions have adopted since its launch on July 24, 2016. It's still marked as "mainline" not "stable" or "longterm" on the kernel.org website, which means that it didn't receive a maintenance update at the moment of writing this article.

As for its new features, Linux kernel 4.7 comes with an updated AMDGPU graphics driver with support for AMD Radeon RX 480 GPUs, LoadPin, a brand new security module that ensures all modules loaded by the kernel originate from the same filesystem, and support for upgrading firmware using the EFI "Capsule" mechanism.

Linux kernel 4.7 also marks the sync\_file fencing mechanism used in the Android mobile operating system as stable and ready for production, implements support for generating virtual USB Device Controllers in USB/IP, supports parallel directory lookups, and introduces the "schedutil" frequency governor, which is faster and more accurate than the current ones.

Source:

<http://news.softpedia.com/news/arch-linux-is-now-officially-powered-by-linux-kernel-4-7-update-your-systems-507224.shtml>

## LINUX KERNEL 4.4.17 LTS HAS UPDATED DRIVERS, ECRYPTFS, X86 AND EXT4 IMPROVEMENTS

The Linux 4.4 kernel series is the most advanced long-term supported one, used in popular GNU/Linux operating systems like Ubuntu. Therefore, it is imperative to get new maintenance updates that patch security flaws discovered by various kernel hackers and developers, as well as

update drivers and introduce performance improvements and new features.

Two weeks have passed since the launch of Linux kernel 4.4.16 LTS, and the new point release promises to change a total of 66 files, with 596 insertions and 256 deletions, according to the appended shortlog and the diff from the previous maintenance version. There are mostly updated drivers in Linux kernel 4.4.17 LTS, with a little bit of arch, filesystems, core networking, core kernel, and mm changes.

Among the changes implemented in Linux kernel 4.4.17 LTS, we can notice updates to ATA, BCMA, CLK, DMA, hwtracing, I2C, input (touchscreen, mouse, joystick), networking, PINCTRL, PPS, s390, Xen, USB, TTY, SCSI, and SPI drivers, minor fixes to the eCryptfs, OverlayFS, NILFS2, and EXT4 filesystems, as well as to the x86 and ARC hardware architectures.

Source:

<http://news.softpedia.com/news/linux-kernel-4-4-17-lts-has-updated-drivers-ecryptfs-x86-and-ext4-improvements-507210.shtml>

## TCP FLAW OPENS LINUX SYSTEMS TO HIJACKERS

A flaw in the RFC 5961 specification the Internet Engineering Task Force developed to protect TCP against blind in-window attacks could threaten Android smartphones, as well as every Linux computer on the planet.

RFC 5961 was designed to make it more difficult to carry out TCP spoofing attacks against long-lived connections. The specification ensures that an incoming packet's sequence number exactly matches the sequence number expected to be next. Further, the attacker also would have to guess a proper ACK value within a scoped range.

Up to now, it was widely accepted that there was no easy way for attackers to know whether two arbitrary hosts on the Internet were communicating over TCP, or to tamper with or terminate such a connection, without being on the communication path themselves.

However, the researchers have found that it is possible to do so

without running malicious code on either communicating party's system.

Source:

<http://www.linuxinsider.com/story/83798.html>

## EXLIGHT LINUX IS NOW BASED ON UBUNTU 16.04.1 LTS AND DEBIAN GNU/LINUX 8.5

ExLight Linux Build 160810 is here to rebase the entire OS to the recently released Ubuntu 16.04.1 LTS (Xenial Xerus) operating system, as well as to upgrade the default desktop environment to Enlightenment 0.20.99.0 from 0.19.12 and move to a kernel from the Linux 4.6 series, specially optimized by Arne Exton to support more hardware.

Probably the most exciting new feature of the ExLight Linux Build 160810 release is the replacement of kernel 4.6.2-exlight with kernel 4.6.0-10-exlight, which appears to be based on the upstream Linux 4.6.5 kernel, the latest version available at the moment of the

announcement for the new ExLight version (Linux kernel 4.6.6 is now the latest).

Other than that, the new ExLight Linux build comes with a 64-bit ISO-hybrid image that users can write on either USB flash drives or DVD discs, support for running the entire operating system directly from RAM by using the "Copy to RAM" option from the boot menu, and a fully functional Ubiquity graphical installer.

Source:

<http://news.softpedia.com/news/exlight-linux-is-now-based-on-ubuntu-16-04-1-lts-and-debian-gnu-linux-8-5-507230.shtml>

## GOOGLE FUCHSIA: NEW NON-LINUX OPERATING SYSTEM COULD MERGE ANDROID, CHROME OS

Google is working on a new operating system named Fuchsia that could combine Linux-based Android and Chrome OS. The open-source OS could run on PCs, mobile devices, and Internet of Things (IoT) gadgets.

Meanwhile, the Google OS features user modes and support for advanced graphics and 64-bit Intel PCs, and uses the Alphabet company's in-house Dart programming language.

Google will release Android Nougat in less than one month. However, the new OS spotted at the GitHub hosting service shows that the company is making plans beyond its mobile OS.

The OS at the Git storage space is probably brand new. Its description tells visitors to pick purple, which is not a color that represents Chrome OS or Android.

Google's Fuchsia OS can be tested on a PC or virtual machine. Travis Geiselbrecht is a Google software engineer and has worked on several other OS projects. He explained that Fuchsia will soon run on the mini CPU Raspberry Pi 3, according to Engadget.

Source:

<http://en.yibada.com/articles/151293/20160814/google-fuchsia-new-non-linux-operating-system-merge-android-chrome.htm>

## NEW FFS ROWHAMMER ATTACK HIJACKS LINUX VMs

Researchers from the Vrije University in the Netherlands have revealed a new version of the infamous Rowhammer attack that is effective at compromising Linux VMs, often used for cloud hosting services.

The Rowhammer attack was discovered two years ago and caused a lot of stir when researchers disclosed it because it showed how by bombarding a row of memory cells, an attacker could reverse binary zeros into ones, and vice versa.

This allowed an attacker to manipulate a computer's memory just by using malware that constantly hammered a row of memory cells which flipped their bits and influenced nearby memory cells into flipping their bits as well.

Things took a turn for the worse when researchers demoed Rowhammer attacks via JavaScript, meaning attackers could compromise a computer's memory

via the Internet.

Flip Feng Shui (FFS) is another variation on the Rowhammer attack that also works in conjunction with memory deduplication, a process through which some operating systems free memory slots by finding duplicate entries and merging them together.

The researchers claim that an attacker can buy access to cloud servers co-hosted with his victim and using an FFS Rowhammer attack can gain control over the victim's accounts despite the complete absence of software vulnerabilities.

Source:

<http://news.softpedia.com/news/new-ffs-rowhammer-attack-targets-linux-vm-setups-507290.shtml>

## ORECX INTRODUCES LINUX HIGH-AVAILABILITY CLUSTERING

OrecX (Booth H50), the world leader of open source call recording applications for call centers, enterprises and communication service providers announced high availability

clustering for its call recording using Linux High Availability / Distributed Replicated Block Device (DRBD). DRBD allows OrecX users to replicate their hard drives in real time between two Linux servers connected back to back via dedicated Ethernet connections.

North American-based OrecX's call recording software is powered by an open, scalable and extensible design that meets the diverse requirements of call centers, VoIP communication providers, large enterprises, and small business at a fraction of the cost and complexity of proprietary closed-end solutions. OrecX's open recording architecture promotes enhancements with third party voice analytics and workforce optimization solutions, further extending the value of the software for partners and clients. OrecX is the primary developer and sponsor of the Oreka GPL open source call recording project hosted on Sourceforge.

Source:

<http://www.channelpartneronline.com/news/2016/08/orecx-intros-linux-high-availability-clustering.aspx>

## CANONICAL PLANS ON IMPROVING THE UBUNTU LINUX TERMINAL UX ON MOBILE AND DESKTOP

Canonical announced that they are planning on transforming the community developed Terminal app into a convergent Linux terminal that's easy to use on both mobile phones and tablets.

Terminal is a core Ubuntu Touch app and the only project to bring you the popular Linux shell on your Ubuntu Phone or Ubuntu Tablet device. And now, Canonical's designers are in charge of making the Linux terminal user experience much pleasant by making Terminal convergent across all screen formats.

To make the mobile Linux terminal user experience even nicer, Canonical plans on implementing an app specific auto-correct dictionary for terminal commands, and add support for custom themes.

Source:

<http://news.softpedia.com/news/canonical-plans-on-improving-the->

[ubuntu-linux-terminal-ux-on-mobile-and-desktop-507331.shtml](#)

## CHAKRA GNU/LINUX USERS GET KDE PLASMA 5.7.3, MOZILLA FIREFOX 48.0 & WINE 1.9.16

Chakra GNU/Linux maintainer Neofytos Kolokotronis informed the community about the availability of the latest KDE Plasma 5 desktop environment and software applications in the main repositories of the distribution.

In addition to the KDE Plasma 5.7.3 desktop environment, Chakra GNU/Linux users can now install some of the latest open-source applications, among which we can mention the Oracle VirtualBox 5.1.2 virtualization software, SQLite 3.13.0 SQL database engine, LibreOffice 5.1.5 office suite, Mozilla Firefox 48.0 web browser, and Wine 1.9.16.

The Chakra GNU/Linux repos now include the Nvidia 367.27 video driver. Support for GTK+ applications has been improved as well thanks to the implementation of the GTK+ 3.20.6 GUI toolkit, and

[laptop-mode-tools 1.69.2 is here to enhance laptop support in Chakra.](#)

Source:  
<http://news.softpedia.com/news/chakra-gnu-linux-users-get-kde-plasma-5-7-3-mozilla-firefox-48-0-wine-1-9-16-507330.shtml>

## CANONICAL TO BRING SNAPPY UBUNTU CORE TO ADVANTECH'S X86-BASED IOT GATEWAYS

Canonical informed Softpedia about a strategic partnership with Advantech to bring the Snappy Ubuntu Core OS to its x86-based IoT gateways.

Avantech Corporation is an industry leader in providing trusted innovative automation and embedded products, as well as various other unique solutions in the Internet of Things (IoT) world. Canonical and Advantech's strategic partnership will certify the Internet of Things (IoT) gateways manufactured by Advantech Corporation for use with the Snappy Ubuntu Core operating system, which means that users of selected Intel x86-

based IoT gateways will be able to download and install a binary image of Snappy Ubuntu Core build specifically for their gateway devices. Additionally, they'll also be able to access to various developer tools provided by Canonical, along with a bunch of services to ease the management and readiness of their device's software and security.

Source:  
<http://news.softpedia.com/news/canonical-to-bring-snappy-ubuntu-core-to-advantech-s-x86-based-iot-gateways-507361.shtml>

## LINUX KERNEL 4.4.18 LTS HAS LOTS OF X86 IMPROVEMENTS, SECURITY UPDATES AND FIXES

Linux kernel 4.4 is an LTS (Long Term Support) one, the latest and most advanced, currently used by many popular GNU/Linux operating systems, including Ubuntu 16.04 LTS (Xenial Xerus), Ubuntu 14.04.5 LTS (Trusty Tahr), and all of their derivatives, such as Xubuntu, Kubuntu, Ubuntu GNOME, Ubuntu MATE, etc., and the Linux Mint 18 "Sarah" series of

distributions.

Linux kernel 4.4.18 LTS is the eighteenth maintenance release, coming only six days after the August 10 availability of Linux kernel 4.4.17 LTS. According to the appended shortlog and the diff from Linux kernel 4.4.17 LTS, this new update changes a total of 50 files, with 623 insertions and 301 deletions, which bring lots of arch and filesystems improvements, as well as several updated drivers.

Looking at the internal changelog, we can notice that Linux kernel 4.4.18 LTS improves support for x86, ARM, MIPS, and s390 hardware architectures, updates the networking stack with minor IPv4 and IrDA fixes, adds a couple of crypto and mm changes, updates the Intel i915, I2C, HID, networking, PNP, SCSI, and TTY drivers, and enhances support for the EXT4 and FUSE filesystems.

Source:  
<http://news.softpedia.com/news/linux-kernel-4-4-18-lts-has-lots-of-x86-improvements-security-updates-and-fixes-507404.shtml>

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Recently, I've made a number of changes to my approach when it comes to coding or my environment in general. Therefore, I wanted to spend this month's C&C discussing the tools I use, and some tips that make my life easier.

### TOOLS

As many of you probably already know - I'm a programmer with a current focus on web development. As such, most of these tools are geared towards that.

• **Atom** (<http://atom.io>) - Created by the folks from GitHub, it offers a similar feature set as Sublime Text, but is free and open source. It's built on web technologies, so I have noticed it being slower than Sublime when opening massively huge files. However, it has such a swath of plugins, that there's not much it can't do. My key plugins are: emmet, git-plus, project-manager, and terminal-plus. The rest of the plugins are typically syntax highlighting (and one JS

linter).

• **Docker** (<http://www.docker.com/>) - This is a containerization system. What this means, is that you can set up software and environments in a container form, which is a step removed from a virtual machine. The difference here is that Docker requires a Linux Kernel, and then passes direct access of the kernel to the container. This is both more efficient, and faster, than something like Vagrant. Best of all - the containers are moveable.

• **Caffeine** (<https://launchpad.net/caffeine>) - Most people probably already know this one, but it's a statusbar application that prevents the display from going to sleep. Extremely useful if you're trying to read something off a monitor while doing something else (in my case, reading wiring schematics off a PDF while soldering). This avoids the need for the "mouse nudge".

• **AwesomeWM** (<https://awesome.naquadah.org/>) - My tiling window manager of choice for a long time now. I typically run multiple desktop environments on my NUC, and

switch to whichever is most useful for my tasks. However, almost all my productivity time (programming, testing, writing FCM articles, etc) are done in a tiling window manager. The reason for this is simple - when I'm working, I tend to tile my windows manually on any other computer, so being able to have it done automatically makes my life easier. I've also tried and used XMonad, DWM, i3, etc. I do tend to prefer the dynamic tiling systems, but the main reason I stick with Awesome is simple: I have my configuration file the way I like it, and it comes integrated with a system tray. If anyone has a recommendation for one that I may also like, feel free to let me know (my email is at the end of the article).

• **Bittorrent Sync** (<https://getsync.com/>) - This is my primary method of sharing files between computers. Especially for files that I require for work - as Sync is a direct peer-to-peer sync, it avoids the privacy questions of storing it on an external server that I don't control (such as Dropbox). Instead, I run it on my

NUC, laptop, and a NAS that is always on. That way, the synchronisation is always available to me.

• **MPD** (<https://www.musicpd.org/>) - The Music Player Daemon - it's essentially a music server that runs in the background, and can be interfaced by a variety of front-end applications (such as mpc, or ncmpcpp). It's my preference because it will remember playback location after a reboot, can be used from the command-line, and creates a database. My front-end of choice is ncmpcpp.

### TIPS

• **Hack** (Font) (<http://sourcefoundry.org/hack/>) - This is an absolutely superb monospace font for coding. I currently use it on all computers in Atom and in my terminal. I used to use Adobe's Source Sans Pro, but since discovering Hack, I haven't got it enabled anywhere anymore.

• **Markdown** (<https://daringfireball.net/projects/markdown/>) - This is a mark-up language that I use for almost



anything that I know will end up on a website. I can combine it with static site generators, or just quickly compile it into an HTML page (and therefore also save it as a PDF).

- **reStructuredText**

(<http://docutils.sourceforge.net/rst.html>) - Similar to Markdown, except I use this for most python-based projects (including a local readthedocs site I run, keeping my work project documentation organized).

- **Git/version control** (<https://git-scm.com/>) - Using a version control system to keep your configuration files up to date and backed up is a pretty common practice. Saving it off-site on a private (or public) repository on Bitbucket or GitHub is a terrific way to make sure you've always got your important configuration files available. I also use it for managing my scaffolding for work projects (a scaffold is a bare bones project folder, containing all my task runner setup and folders).

- **Bash** - Learning bash is extremely useful for automating tasks (using cron) or just grouping together a typical workflow (such as using `imagemagick` to crop an image, and then copying it to a new location).

- **Shell aliases** - For a single

command with a set of arguments you usually use, an alias is my preference (over a Bash script). I use this (for example) for keeping my various SSH logins straight.

- **Keyboard shortcuts** - This is a very generic point, certainly. However, when I'm busy working (especially in a tiling window manager), I hardly ever need to touch my mouse. I find this to be the most efficient way to work for me. When first setting up an environment, it's not uncommon for me to spend a good hour or two setting up shortcuts and reorganizing default ones so that they don't conflict, and I can easily reach any important combination as fast as possible.

I hope this article proves to be interesting for some readers. If you've got your own preferences, you're of course welcome to stick to those! However, this article is geared towards anyone who is looking for recommendations. If you have any questions (or feel I should look at an alternative), feel free to email me at [lswest34+fc@gmail.com](mailto:lswest34+fc@gmail.com).



The Ubuntu Podcast covers all the latest news and issues facing Ubuntu Linux users and Free Software fans in general. The show appeals to the newest user and the oldest coder. Our discussions cover the development of Ubuntu but aren't overly technical. We are lucky enough to have some great guests on the show, telling us first hand about the latest exciting developments they are working on, in a way that we can all understand! We also talk about the Ubuntu community and what it gets up to.

The show is presented by members of the UK's Ubuntu Linux community. Because it is covered by the Ubuntu Code of Conduct it is suitable for all.

The show is broadcast live every fortnight on a Tuesday evening (British time) and is available for download the following day.

[podcast.ubuntu-uk.org](http://podcast.ubuntu-uk.org)



## EXTRA! EXTRA! READ ALL ABOUT IT!

Our glorious news reporter (Arnfried) is posting regular news updates to the main Full Circle site.

Click the NEWS link, in the site menu at the top of the page, and you'll see the news headlines.

Alternatively, look on the right side of any page on the site, and you'll see the five latest news posts.

Feel free to discuss the news items. It's maybe something that can spill back from the site into the magazine. **Enjoy!**



This month, we will be using a 16x2 LCD display with an i2c interface to do the same thing that we did last month (FCM 111) with the Dallas Semiconductor DS18B20 Temperature sensor. If you remember, we had to use many I/O pins on the RPi. This time, thanks to the i2c display, we will need only 5 pins (+5v, Gnd, Sensor Data, SDA (data) and SCL (clock)) to do the same thing.

Before we get started with our project, a discussion about i2c is in order. I have distilled the following discussion from a wonderful tutorial by 'SFUPTOWNMAKER' at Sparkfun.com which can be found at

[https://learn.sparkfun.com/tutorial/s/i2c?\\_ga=1.242063243.863781319.1463423290](https://learn.sparkfun.com/tutorial/s/i2c?_ga=1.242063243.863781319.1463423290)

### i2c

Inter-Integrated Circuit (i2c) protocol is intended to allow multiple "slave" digital ICs to communicate with one or more master chips. Like Serial Peripheral

Interface (SPI), it is intended for only short distance communications within a single device. Like Asynchronous Serial Interfaces (RS-232 or UARTs), it requires only two signal wires to exchange information.

### RS232 (ASYNCHRONOUS COMMUNICATIONS)

No clock data is required on the lines; however, both sides must agree on the communications data rate. Requires hardware overhead (UART) at each end.

In addition to the 8 data bits, at least one start and one stop bit are required for each data frame. While it is possible to connect multiple devices on a single serial port, there are issues with multiple devices trying to use the two lines at the same time.

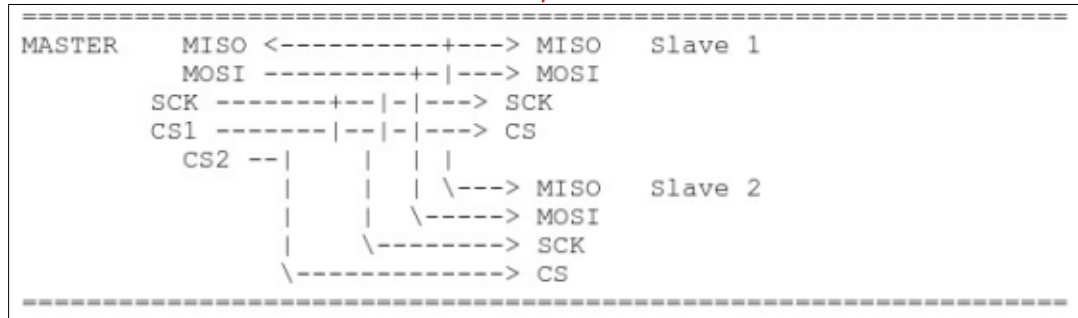
Most UART devices can support only certain set baud rates, the usual maximum is 230400 bits per second.



### SPI

The biggest drawback with SPI is the number of pins required. Connecting a single master to a single slave requires four lines, each additional slave requires one additional chip select (CS) IO pin to the master. If you want to use many sensors/devices connected to the master, the required number of pins can quickly overwhelm the number of available inputs/outputs.

SPI (see diagram below) is good for high data rate full-duplex (simultaneous send/receive of data). Data rates can be upwards of 10 MHz.



### i2c

i2c requires only 2 lines like async serial, but those two lines can support up to 1008 slave devices. Unlike SPI, i2c can support a multi-master system – allowing multiple slave devices to communicate to multiple master devices. There is a limitation that the masters can not communicate with each other on the i2c bus, and they must take turns using the bus lines. i2c has a similar overhead to Async in that, for each 8 bits of data, one extra bit is required as an "Ack/Nack" bit. The hardware requirements are more complex than SPI, but less than Async.

Data rates are somewhere between Async and SPI. Most i2c devices can communicate at between 100 KHz to 400 KHz.





In the diagram above, SDA is the data line and SCL is the clock line.

Hopefully I didn't completely confuse you and you are ready to go ahead with our project.

A very good resource for what we are about to do is at <http://www.circuitbasics.com/raspberry-pi-i2c-lcd-set-up-and-programming/>

Make sure that i2c is enabled on the RPi. This is set in raspi-config.

Now, in a terminal, use apt-get to install two support libraries. (I wasn't able to get it to work as a single liner for some reason.):

```
sudo apt-get install i2c-tools
```

```
sudo apt-get install python-smbus
```

I was able to get Fritzing to come up with the i2c backpack

(shown top right).

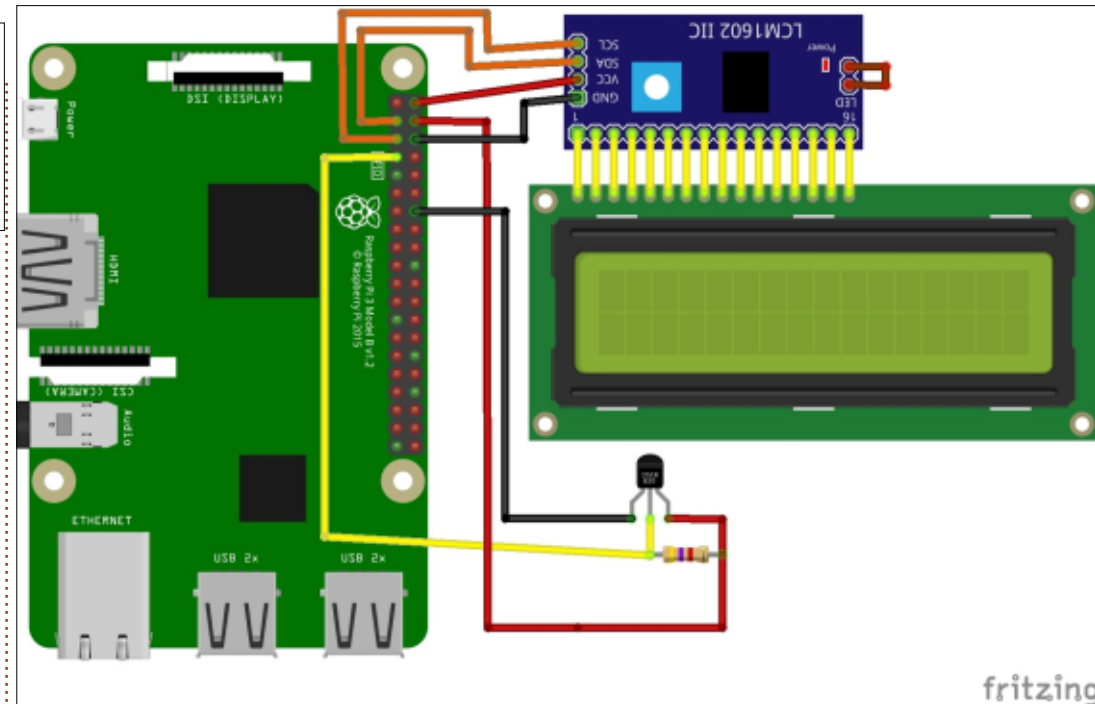
Hook up the SDA pin of the i2c backpack to PHYSICAL pin 3 on the RPi (this is GPIO2) and the SCL on the backpack to PHYSICAL pin 5 (GPIO3). Pick a free 5v pin on the RPi (either pin 2 or 4) and a free ground (pins 6 or 9) and connect them to the backpack VCC and Gnd. Don't forget we need the temp sensor connected to GPIO4 as last month (along with the resistor to +5VDC).

Now reboot and once the RPi is up, in a terminal type:

```
i2cdetect -y 1
```

This will verify that the i2c interface is working on your Pi, and also tell you what address is used by the LCD display device. Look at the screen dump shown right to see what it should look like.

As you can see, my device is at 3f, but yours might be at a different address. When you



```
pi@raspberrypi:~ $ i2cdetect -y 1
    0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  3f  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
pi@raspberrypi:~ $
```

create the driver below (either typing directly from the article or from the pastebin page), you will need to enter your device address in line 22.

The first set of code is a library that will work as a driver for the i2c LCD. This should be saved as i2c\_lcd\_driver.py. The code is on <http://pastebin.com/ueu18fNL> to save you typing.

Now, we are going to do a short test to make sure everything works. Type in the following code and save it as `i2c_test1.py`, into the same folder as the driver that we just wrote...

```
import i2c_lcd_driver
from time import *

mylcd = i2c_lcd_driver.lcd()

mylcd.lcd_display_string("This is a test",1)
```

If everything here is correct, you should see “This is a test” at the first character position on the first line of the LCD display. If it’s good, we can move forward. The following code is basically the same code from last month modified to use the i2c display instead of the parallel version.

That pretty much wraps up our discussion of LCDs and i2c. We will be using i2c LCDs and other i2c devices in the future, so you should keep them safe for later on. Next month, we will start working with motors, servos and stepper motors. So, run out, and get a hobby motor to be ready. In a few months, we’ll start working with the Arduino microcontroller and then learn to interface the RPi to

```
import i2c_lcd_driver
from w1thermsensor import W1ThermSensor
from time import *

mylcd = i2c_lcd_driver.lcd()

#mylcd.lcd_display_string("This is a test",1)

sensor = W1ThermSensor()
#setup_lcd()
while 1:
    # This is basically the same code as last month, so use
    # whichever temp type you want.
    temp_in_fahrenheit = sensor.get_temperature(W1ThermSensor.DEGREES_F)
    # Print the temp to the terminal...
    print temp_in_fahrenheit
    # Now print it to the i2c LCD module...
    mylcd.lcd_clear()
    mylcd.lcd_display_string(str(temp_in_fahrenheit),1)
    sleep(3)
```

control the Arduino.

Until then have fun.



**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.



I have found that, once a person gets bitten by the LaTeX bug, there is never a lack of something to do or learn. All it takes is a task that needs to be done, a desire to take a path less travelled to complete the task (with style!), and a person is off and away into the LaTeX way of doing things. Sometimes we have to use the software provided in an office suite, because they do some (OK, many) things well. I am typing this in LibreOffice Writer because that is the format that FullCircle accepts. And that is OK, as there are things that may be best left to the office suite, like spreadsheets. The right tool for the job.

In my last article, I demonstrated that LaTeX code (or any markup code) can be inserted into data that is in a spreadsheet to format the data for publication. This comes in handy for creating something like a pocket address book from information in a tabular database.

Tabular data and LaTeX are not strangers to one another, and the

combination is covered in many of the basic LaTeX manuals. There are also special packages written to help us communicate tabular data with LaTeX, most of these packages have detailed manuals of their own like the 38-page manual for the package `csvsimple`, a package that I hope to cover in a future article. Then there is `Spreadtab`.

`Spreadtab` is a LaTeX package that can bring some of the features of a spreadsheet to your LaTeX documents. Or, as Christian Tellechea, the creator of the package, said in the abstract of the (extremely well written) manual:

*“This package provides spreadsheet features for LaTeX table environments.*

*The main feature allows the user to construct tables in a manner similar to a spreadsheet where cells are used in formulas to generate values in other cells. The package computes the formulas in the correct order, and finally displays the table with the numeric results.”*

```
\documentclass[12pt, letterpaper]{report}
\usepackage[latin1]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{makeidx}
\usepackage{graphicx}
\usepackage{spreadtab} % required to activate spreadtab

\begin{document}

\begin{spreadtab}{{\tabular}{l|l|l|l|l}}

```

Up until the time this package was written, there was nothing in the LaTeX environment that could do this. Christian Tellechea took this on as a programming exercise. Once again, someone scratches an itch and the world is a better place for it. Thank you, Christian!!!

To whet your appetite for `Spreadtab`, I will demonstrate some of the basic things you can do with this package. One of the incentives is to Keep It Simple Silly (KISS) – I am not a mathematician by any stretch of the imagination, so I better keep this down to basic bean counting.

What I will show you here can be done with a spreadsheet,

however if you want to place your spreadsheet information into a LaTeX document, then you will find this package useful. Or, if you have a document with calculations that you want to reuse, this package can help you create the base original document.

Everything starts in a new directory (rule number one) and a preamble at the top of your file (see box above)

The tabular data that you want to include must be described to the package:

- `{\tabular}` tells LaTeX “here comes some information in tabs”
- `{\with lower case “l”s}` tells LaTeX how many tabs there are



# HOWTO - SPREADSHEET FUNCTIONS IN LATEX

• the “|” tells LaTeX where to place any vertical lines.

The “&” signals a cell or tab and labels in the cells are preceded with the “@”. Note that, within the tabular environment, & does not require a “\” before it.

To end this environment use this command:

```
\end{spreadtab}
```

Let’s set up a page with five tabs, a vertical line between tab 4 and 5, and with labels for columns and rows.

Given the above, our document can look like that shown below after the preamble.

Notice how nicely I have lined up the “&”. They do not have to be, and as you add or subtract data they will move around – that is OK. However, keeping everything aligned will help you correct errors

and/or prevent you from getting dizzy.

You will have to visualise that there are five columns here, and four rows, and just like a spreadsheet, columns have a letter and rows have a number. This will enable us to make calculations, just like in a spreadsheet. So let’s add some numbers and calculations (see box top right).

And all of that will give us:

	foo	boo	hoo	
cat	2	4	6	12
dog	3	7	9	19
rat	3	8	2	13
	8	19	17	

In my example here, the data is flush left because of the five letter l’s in the tabular command. To move data to the right replace the l’s with r’s, and c will place the data in the centre of the column.

```
\begin{spreadtab}{{tabular}{l|l|l|l|l}}
& @ foo & @ boo & @ hoo & \\
@ cat & 2 & 4 & 6 & sum(b2:d2) \\
@ dog & 3 & 7 & 9 & sum(b3:d3) \\
@ rat & 3 & 8 & 2 & sum(b4:d4) \\
\hline
& sum(b2:b4) & sum(c2:c4) & sum(d2:d4) & \\
\end{spreadtab}
```

	foo
cat	2
dog	3
rat	3.141592653589793238
	8.141592653589793238

Just for a giggle, lets change the rat “3” with the word “pi”.

place 8/2 in a tab, it will show a 4. Place a 8\*5 in a tab and it will show a 40.

You can also make calculations within tabs with the \* and / – if you

Let’s put this to work:

```
\begin{spreadtab}{{tabular}{l|l|l|l|l}}
& @ foo & @ boo & @ hoo & \\
@ cat & & & & \\
@ dog & & & & \\
@ rat & & & & \\
\end{spreadtab}
```

```
{\Large Wobbly Cat Catnip Farm}
\medskip
\today\
\STautoround*{2}
\begin{spreadtab}{{tabular}{l|l|r|}}
% A B C
@ 1 & @ 10 pacs Deluxe Catnip \ $7.00& 7.00*10.00 \\
@ 2 & @ 16{\small OZ} Furball chaser \ $6.00& 6.00*1 \\
\hline
@3 & @ Total& sum(c1:c2)
\end{spreadtab}
\\
\medskip
Thank you for your order.
\end{document}
```

Here (previous page, bottom right) is an invoice for a growing concern.

The command `\STautoround*{2}` provides 2 decimal points with the “\*” filling in zeros when necessary.

Placing a % at the start of a line hides it from LaTeX but the A B C can help us keep track of the columns.

The @ 1 @ 2 @ 3 gives us the line numbers, but as “words” – so there are no decimal places.

It looks like the image above.

The only “Gotcha” I could find is things can go haywire if you have a blank line within the spreadtab environment.

I have just scratched the surface with Spreadtab, really. My tables here are very simple, but what you will see in the spreadtab manual are much more complex and interesting. You can download the manual from <https://www.ctan.org/pkg/spreadtab?lang=en>

Once again, a big thank you / merci beaucoup to Christian

## Wobbly Cat Catnip Farm

July 8, 2016

1	10 pacs Deluxe Catnip \$7.00	70.00
2	16OZ Furball chaser \$6.00	6.00
3	Total	76.00

Thank you for your order.

Tellechea for all of his work on this package and the documentation.



**John Eddie Kerr** is a law librarian in Guelph, Ontario Canada. Ubuntu Linux is his desktop at home and at work. Xubuntu powers his Raspberry Pi 3 and Ubuntu Mate powers his Raspberry Pi 2.



In this series of articles, I will be building a text-based application with Free Pascal, using its text-based interface for user interaction. This will be combined with other, more modern, technologies such as database access using SQL and Web access with HTTP. The final aim of the project is to demonstrate how Pascal can be used to build a modern application, while avoiding the overhead associated with a graphical interface that uses a widget set such as GTK or Qt.

In the first part of this series we installed the required compiler software and developer's interface. We compiled a simple console-based program and a first Free Vision application. In this second part we will be tuning our Free Vision interface and making it respond to commands.

## FLESHING UP THE MENU

Let us now create a bespoke menu and make it responsive. To do so, we will overwrite two

separate procedures of the standard TApplication object. The first is procedure InitMenuBar which, as its name suggests, populates the menu bar at the top of the screen. The other is the procedure that handles window events, in which we will be defining how our application needs to respond to button presses and suchlike. So our application object derives from the standard TApplication, with the addition of these two procedures. They are declared as "virtual" (top right) since they overwrite existing methods.

```
type
  TMyApp = object (TApplication)
    procedure InitMenuBar; virtual;
    procedure HandleEvent (var Event: TEvent); virtual;
  end;
```

We will be putting in a very basic menu bar with two submenus: a "File" menu with some standard options, and a "Help menu" with an option to open up the traditional "About" dialog (see box below).

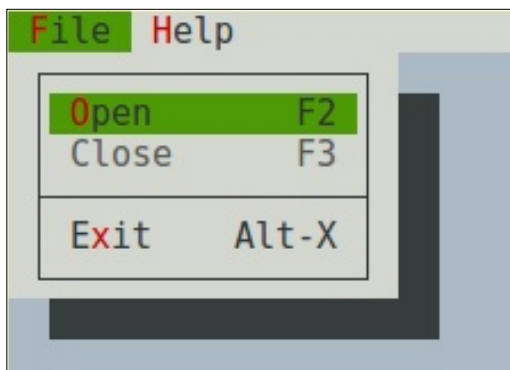
As readers accustomed to Turbo Pascal will have noticed, this is exactly the same syntax. In fact, I

would not be surprised to learn that one of my projects from back then would just compile under Free Pascal. That is, if I manage to dig out the 3½" diskettes and a disk drive that still works. Just to refresh memories, let us note that "~" is used to indicate key accelerators, hcNoContext is the null Help Context, kbF2 is the code for keyboard key F2, and cmOpen is a 16-bit unsigned integer (word)

```
procedure TMyApp.InitMenuBar;
var
  R: TRect;
  pFileMenu, pHelpMenu : PMenuItem;
begin
  GetExtent (R);
  R.B.Y := R.A.Y + 1;
  pHelpMenu := NewSubMenu('~H~elp', hcNoContext, NewMenu(
    NewItem('~A~bout', '', 0, cmHelp, hcNoContext, nil)),
    nil);
  pFileMenu := NewSubMenu('~F~ile', hcNoContext, NewMenu(
    NewItem('~O~pen', 'F2', kbF2, cmOpen, hcNoContext,
    NewItem('~C~lose', 'F3', kbF3, cmClose, hcNoContext,
    NewLine(
    NewItem('E~x~it', 'Alt-X', kbAltX, cmQuit, hcNoContext, nil))))),
    pHelpMenu);
  MenuBar := new (PMenuBar, Init (R, NewMenu (pFileMenu)));
end;
```

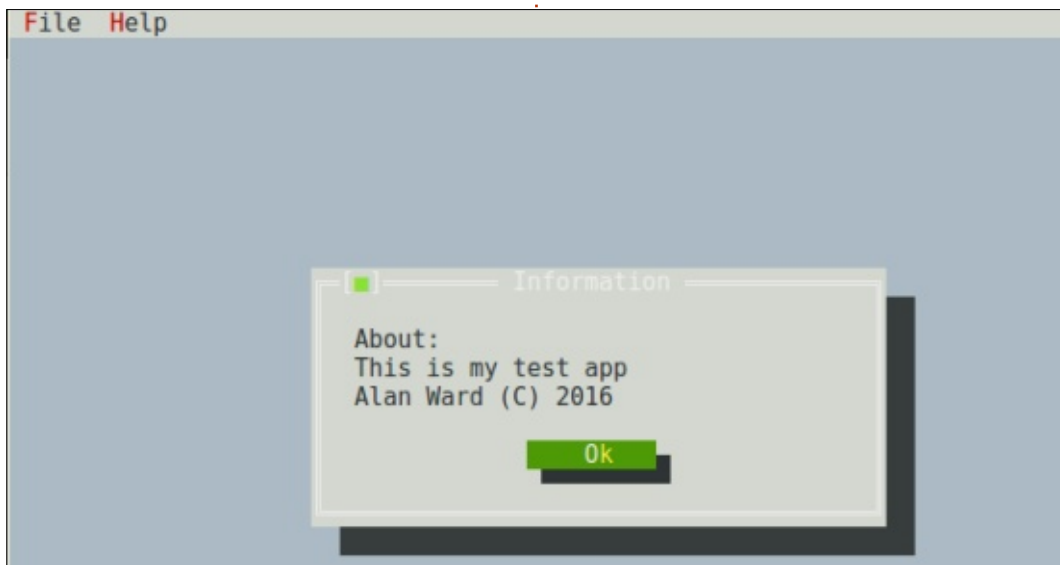


code for standard command “Open”. The rest should be quite easy to figure out.



## RESPONDING TO EVENTS

The menu prepared above will actually respond to some buttons, but not to others. The difference is that TApplication’s default HandleEvent method knows what



```
procedure TMyApp.HandleEvent (var Event: TEvent);
begin
  inherited HandleEvent (Event);
  if Event.What = evCommand then
  begin
    if Event.Command = cmHelp then
    begin
      MessageBox ('About: '+#13#10+'This is my test app'+#13#10+'Alan Ward (C) 2016',
        nil, mfInformation or mfOKButton);
    end;
  end;
end;
```

to do when the cmQuit command is issued (it simply quits). But it has not been programmed to respond to other events, such as the cmHelp command we put into the Help > About menu item.

This is why we will be replacing the existing HandleEvent with our own. For example:

It is especially important to include the original HandleEvent with the “inherited” command, since it handles the cmQuit command and we still want that to work.

To respond to the cmHelp command, we are using a simple if structure to set up a MessageBox. This is a fast way of creating a message dialog box, that can be of several different types (Information, Alert, Error...). We do not get to personalize it much, since the final parameter can only hold flags to set up the dialog title, and the choice of the “OK” and/or “Cancel” buttons. To create a more interesting dialog window, we would need to write our own class (inheriting from TWindow or TDialog), which, though feasible, would be slightly more work. See

the third article in the series for more details.

## SETTING UP A FILE INPUT BOX

There are also other, predefined, dialog types available. To take a classic example, in our programs we sometimes need to prompt the user to enter a file through the typical File Open dialog. Free Vision does things in the very same way as Turbo Vision. We will modify our HandleEvent to respond to cmOpen. To do so, we will need several variables:

```
var
  FileName: String;
  result : integer;
  pOpen : PFileDialog;
```

FileName is a string to save the user-inputted filename, result will

contain the command code of the button chosen (cmOpen or cmCancel), while pOpen is a pointer to the new dialog to be created. Now, within HandleEvent, let us reply to cmOpen in the same way we handled cmHelp (see box top right).

We have created a new FileDialog object, specifying that we wish to filter files with the '\*.txt' pattern. When executed, the command chosen by the user is stored in variable result, and can then be examined to control subsequent actions.

The dialog produced has nothing special to it as it is standard in Turbo and Free Vision. It just works and is very responsive.

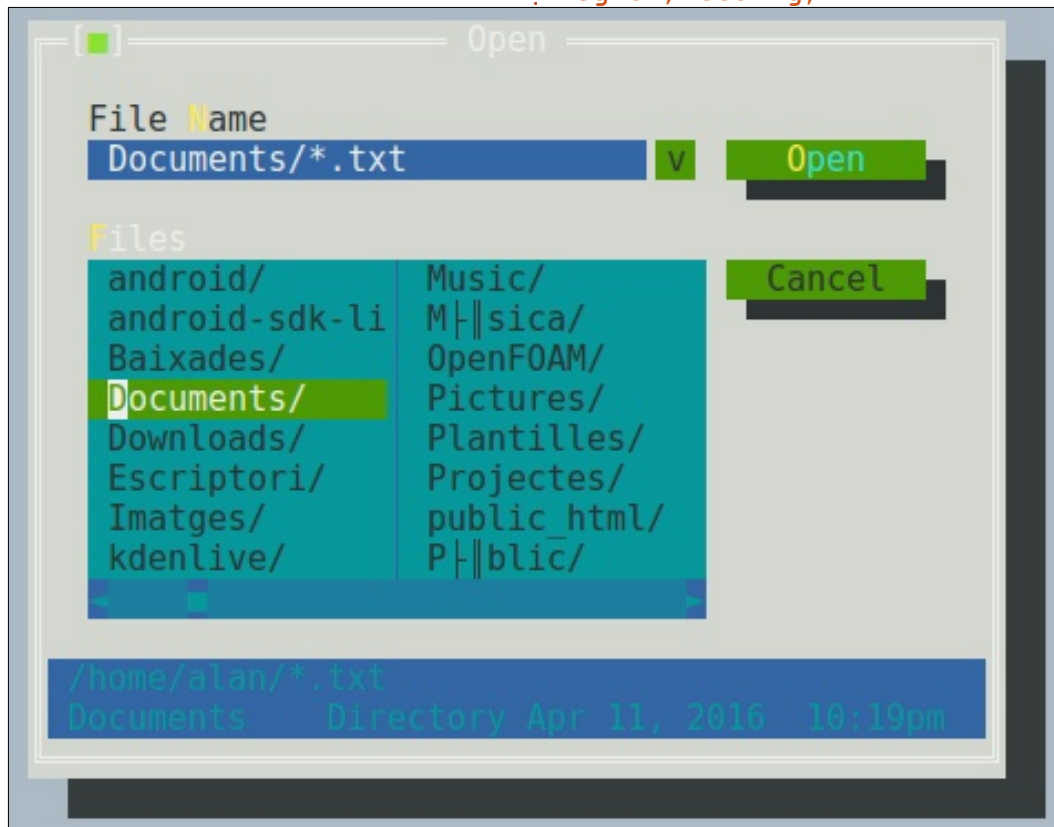
However, there are a couple of points to be noted since the last time I stared at one of these, back in the days of MS-DOS. The first is that it seems to handle well a POSIX file system, with the "/" file separator instead of MS-DOS's idiosyncratic "C:" and "\". The user can easily navigate through a standard Ubuntu home directory. On the other hand, we can also see that Unicode characters in filenames that do not appear in

```
if Event.Command = cmOpen then
begin
  pOpen := New(PFileDialog, Init('*.*txt', 'Open', 'File ~N~ame',
    fdOpenButton, hcNoContext));
  result := ExecuteDialog (pOpen, @FileName);
end;
```

the common ASCII codepage (codes up to 127) have been altered, specifically the accents in "Música" and "Públic". This may be a minor problem for some, or major for others if the intended end user's environment is mostly in a non-latin script.

By this point, we have been using several of Free Vision's library units, which must be included at the beginning of our program file:

```
uses App, Objects, Menus,
Drivers, Views, Dialogs,
MsgBox, StdDlg;
```



The complete code for this example is available at <http://pastebin.com/ZTbN7Eft>, in which the reader can see the points covered in this part of the series: personalizing the Free Vision menu bar, responding to commands, and using default message boxes and dialogs. In the next part, we will see how to connect our application to a modern database such as Sqlite3.



**Alan** holds a PhD in Information and the Knowledge Society. He teaches computer science at Escola Andorrana de Batxillerat (high-school). He has previously given GNU/Linux courses at the University of Andorra and taught GNU/Linux systems administration at the Open University of Catalunya (UOC).



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# HOW-TO

Written by Mark Crutch

# Inkscape - Part 52

Last time, we looked at Flood Fill and Turbulence – a pair of primitives that can be used to fill the filter area with, respectively, a flat color or a pseudo-random cloud of colors. But there's a universe of other fills you might like to use, from stripes to polka dots, flowers to butterflies. To cater for such infinite possibilities, the SVG standard provides a way to pull another image into your filter chain, using the Image primitive. This allows you to not only use bitmap images, but can even reference other parts of your SVG file to let you pull your own creations into the filter chain. There's just one little problem: the Inkscape implementation is well and truly broken.

Let's start with the bit that does work, at least to some

degree: importing an external bitmap image into your filter chain. As usual, we'll begin with a bit of text as the object to which we'll apply the filter. You can, of course, use any type of object, but I find that text gives me a quick and easy way to see how a filter will look when applied to a complex shape, rather than using just a simple rectangle or circle.

Create a filter on the test object using one of the methods described in Part 48, and, if necessary, remove any existing filter primitives. Now add a single "Image" primitive to the filter chain, and take a look at its minimal controls at the bottom of the dialog. The "Source of Image" field will be used to hold the path and filename of an external image file, or the XML id of another element in your image. For now,

you should choose an external bitmap image by clicking on the "Image File" button and picking one from your hard drive. We'll use our tried and tested Mona Lisa image, giving us the following output (unfiltered text on the left, filtered on the right) when the filter is created in Inkscape 0.48 (bottom left).

Now you don't need to be an expert in renaissance art to notice that the image has been distorted somewhat. Now the same filter created in 0.91 (bottom right).

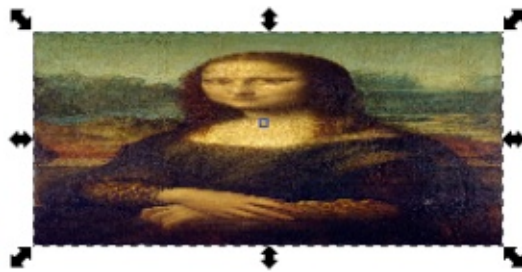
Well, we've lost the distorted aspect ratio, but it doesn't exactly fill the filter area – although we can do something about that, as we'll see shortly. This change in behaviour could potentially mean that drawings created in 0.48 may not appear the same in 0.91 if they

make use of this filter primitive.

In 0.48, you're stuck with the default position and size of the image – i.e. stretched to fill the bounding box of the object. The official Inkscape manual makes it sound as though you can at least set the position and size of the image within the filter by using the XML editor, but, despite many attempts, I haven't been able to achieve this. To be fair, the manual does state that the implementation in Inkscape "doesn't correctly position images" – though that seems to be something of an understatement based on my own tests.

With 0.91, things fare a little better – though you'll still have to make your way to the XML editor to change the parameters, as they're still not reflected in the

## IMAGE FILTER



## IMAGE FILTER



GUI. Dig out Part 31 of this series if you need a refresher on how to use the XML editor. The XML element you'll need to modify is the `<svg:feImage>` which is inside an `<svg:filter>` in the `<svg:defs>` section of the file. You can add 'x', 'y', 'width', and 'height' attributes, although, in my tests, none of them took effect until I also added a 'preserveAspectRatio' attribute. In subsequent tests, once such an attribute was already present, I had to change it to a different value and back again for changes in the other attributes to be reflected in Inkscape's canvas. Changing it to an invalid value and back does the trick, so you can just add a single letter to the end of the existing value, click "Set", remove the letter, then click "Set" again.

So just what is a valid value for preserveAspectRatio? A good starting point is the word "none" - that will cause Inkscape to ignore the aspect ratio of the original image, and stretch it to fill the bounding box of the object, resulting in a similar appearance as with version 0.48. But there are other options - lots of them, all similarly and confusingly named! They all start with a lowercase 'x'

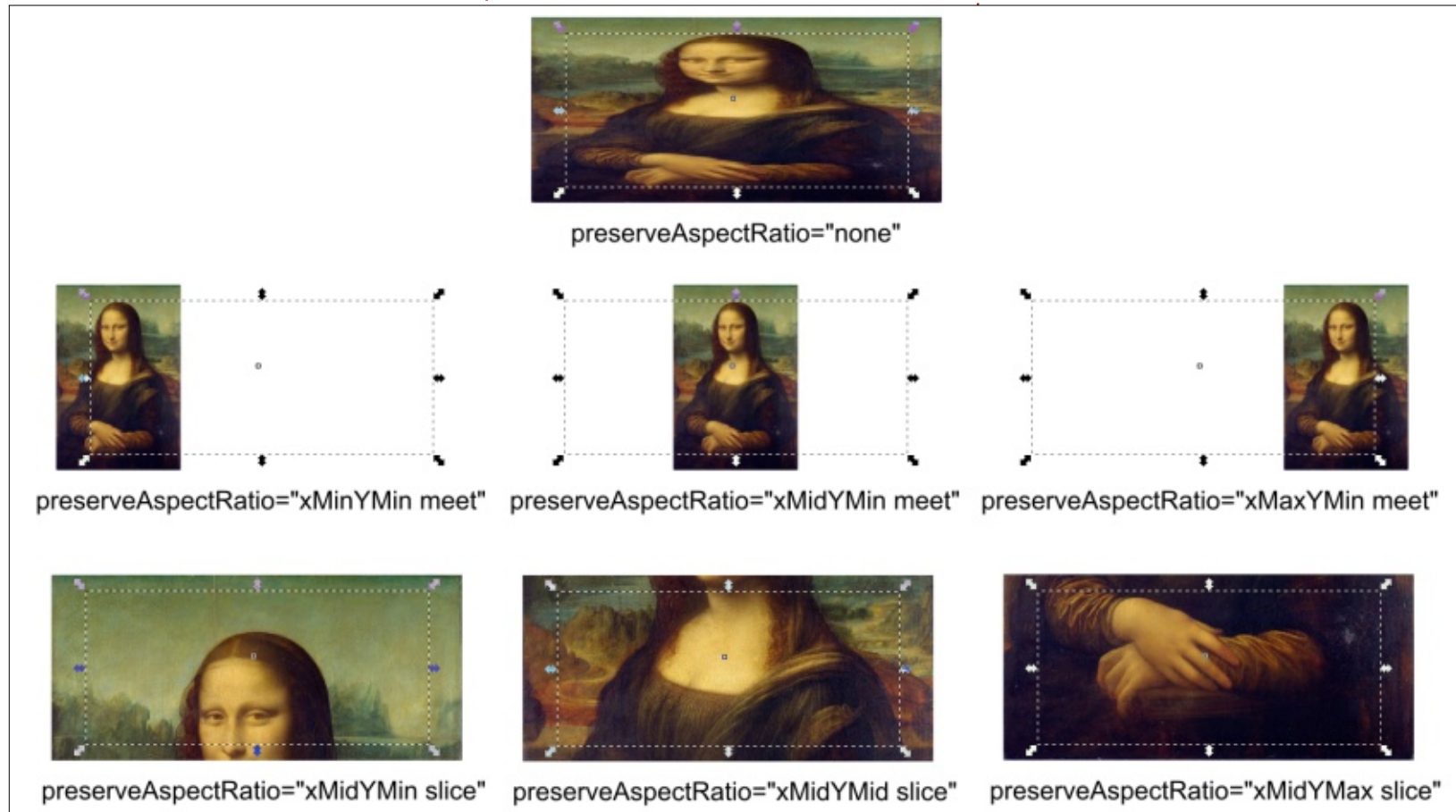
and are followed immediately by 'Min', 'Mid' or 'Max' (which, for the x direction, basically means left aligned, centered or right aligned), then followed immediately by an uppercase 'Y' and another 'Min', 'Mid' or 'Max' (top, middle or bottom aligned), followed by a space and an optional keyword of 'meet' (scale the image so that it's all visible) or 'slice' (scale the image to fill the bounding box, whilst preserving the aspect ratio,

but hide any parts that extend beyond the bounding box - i.e. just show a slice of the image). Confusing, isn't it? Perhaps some examples (below) would help.

No, I don't know why the SVG working group went for the confusingly similar 'Min' and 'Mid', nor why 'x' is lowercase whilst 'Y' is uppercase, nor why they chose the words 'meet' and 'slice' rather than 'scale' and 'crop'. I do know,

however, that my examples are just the tip of the iceberg: there are 19 possible combinations, without considering the aforementioned 'x', 'y', 'width' and 'height', which can have a dramatic effect on what actually appears in your filter.

Until Inkscape gains a UI to make some sense of this madness, I recommend leaving the advanced options of this filter to the experts. But if you do want your image to



be distorted to fit the bounding box, per 0.48, you will have to take a deep breath, roll up your sleeves, and wade into the XML editor to deliver a swift dose of `preserveAspectRatio="none"`.

There's one last thing worth noting about the Image primitive, when used with external images. By default, Inkscape will put the entire path to your image into the filter UI. In order to keep your drawings more portable I strongly recommend keeping any required images in the same folder as your drawing, and then manually editing the entry in the filter settings to remove the path, leaving just the filename. You might consider embedding your image into your document, rather than keeping it in an external file, but read on

The Image primitive should have one more trick up its sleeve. but, yet again, it's broken. It's possible to select an object (or group) in your Inkscape image and then click the "Selected SVG Element" – at which point the Source of Image box will populate with the ID of the element. In this way, it should be possible to pull any other SVG element into your filter chain... except that it doesn't

work. It does appear to function in 0.48, in that a rasterised version of the element is pulled in and stretched to fill the bounding box, but in 0.91 even that limited ability seems to have vanished.

So there you have the Image primitive – a filter that promises so much, but delivers so little. The useful parts that work in 0.48 are broken in 0.91, whilst the useful parts from 0.91 require you to wade into the XML editor. Meanwhile, the pitiful UI sits back, laughing at your efforts to attempt something as audacious as setting the position of your image within the bounding box. Let's hope that UI gains a little flesh in a future release, and that the ability to use SVG elements makes a welcome return.

That concludes our look at the "fill" primitives in Inkscape. The SVG spec, though, has one other – "Tile" – which lets you feed in the output from another primitive to be repeated ("tiled") over the whole of the filter region. In order for this to work, the incoming primitive needs to have a filter region that is smaller than the one it's going to be tiled into; but, as Inkscape uses a single filter region

definition for the entire filter chain, even if this primitive were to be implemented, it would have no practical effect.

It hardly seems fair to have wasted your reading time with a description of one poorly implemented filter, and another that hasn't been implemented at all, so I'll finish this instalment by adding another useful primitive to your toolbox: Morphology.

Despite its fancy sounding name, this is a very simple filter: all it does is makes things thicker or thinner. And it does so with the minimum of fuss: there's just a drop-down to select between "erode" (make things thinner) and

"dilate" (make things thicker), and a pair of optionally linked "radius" sliders to set the amount of erosion or dilation that will take place. Let's see this filter in action – in each case the first text object is unfiltered, and the second is filtered as described, with a radius of 2.5.

These filters are particularly useful when used with the Composite primitive, often in "In" or "Out" modes. In the following example, I've used a Flood filter to create a translucent white fill, then used a Composite "In" to trim it to the size of my eroded text. A little Gaussian Blur and Offset later, and you've got a filter that gives a 3D appearance to your text.

**MORPHOLOGY:  
EROSION**

**MORPHOLOGY:  
EROSION**

**MORPHOLOGY:  
DILATION**

**MORPHOLOGY:  
DILATION**

**Fake 3D  
Effect**

**Fake 3D  
Effect**

“Out” can work well with dilation, to punch out the center of the dilated image. As a simple case, consider a Morphology primitive that dilates the source, then a Composite Out that leaves only those parts of the image that are outside the original source object. What you're left with is an outline of your object, with a transparent middle.

Now, rather than punching out the source object, what if you punch out another dilated version, such that you're removing a small dilation from the core of a large dilation. Merge the original object back in, and you have an outline that surrounds the original, at a distance set by the smaller dilation with a thickness equal to the difference between the inner and outer dilations (you may need to increase the size of the filter region to avoid the result being cropped).

Finally, how about taking the previous idea and stacking it up a little further. You can have several outlines, all at different distances from the original object, then just merge everything together at the end. Things start to get a little

complex as you add more outlines, because you're juggling a pair of Morphology primitives and a Composite for each layer of the onion, but, in principle, it's possible to carry on adding as many as you like, so long as you can keep track of them all.

**Outline Effect**

**Outline Effect**

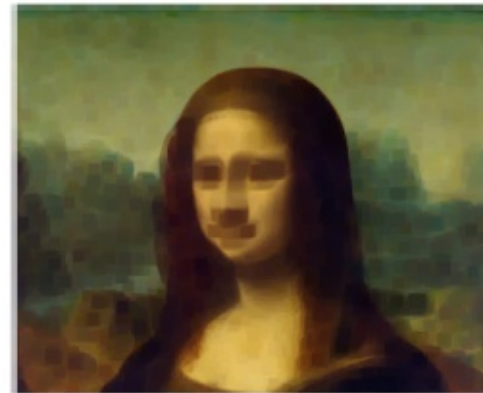
**Outline Effect**

**Outline Effect**

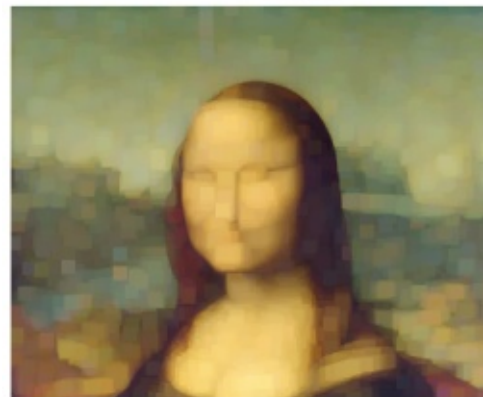
Or how about this version, where I've also used Color Matrix primitives in Hue Rotate mode in order to give each outline its own color:

**Multi-Coloured Outline Effect**

It's worth remembering that filters are bitmap operations that take place at the rendering stage. Although you can think of the Morphology primitive as thinning or thickening your image, it's not doing so in a vector sense, but rather by just adding or removing pixels in a bitmap version of your object. With that in mind, it also makes sense that you can apply this primitive to bitmap images



**Erode**



**Dilate**

imported via the Image primitive. This allows you to hide the fine details of an image by eroding them away, or blotting them out through dilation of adjacent areas, without introducing the sort of softness you would expect if you just blurred the images. In either case, Mona ends up looking somewhat worse for the experience!

## IMAGE CREDITS

“La Gioconda” (aka “Mona Lisa”) by Leonardo da Vinci  
[http://en.wikipedia.org/wiki/File:Mona\\_Lisa,\\_by\\_Leonardo\\_da\\_Vinci,\\_from\\_C2RMF\\_retouched.jpg](http://en.wikipedia.org/wiki/File:Mona_Lisa,_by_Leonardo_da_Vinci,_from_C2RMF_retouched.jpg)



**Mark** uses Inkscape to create three webcomics, 'The Greys', 'Monsters, Inked' and 'Elvie', which can all be found at <http://www.peppertop.com/>



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An interesting perk to the Chromebook is Google Voice, which is directly tied to the Gmail account. Google started the telephony services in March 2009 when it purchased the service GrandCentral. In 2011 Google Voice was available to the UK and other countries. However, today many features of Google Voice are folded into Google Hangouts. There is a simple instructive guide here that can be found on Google Voice Wikihow (<http://www.wikihow.com/Set-Up-Google-Voice>). I used my Google Voice account as a means to protect my real phone number from certain people. However, are there alternatives to this popular service?

Phonebooth, Magic Jack, and other cloud phone providers are available with free services. Yet the free services offerings are slim, and are mostly designed to entice a person into a paid monthly subscription. Sumit Chauhan wrote an editorial that highlights 17 Google Voice competitors, at [compsmags.com](http://compsmags.com). For the sake of

simplicity, I will review any of the 17 services that offer a number that uses WiFi Calling and are Linux compliant.

After surveying the 17 alternatives from the list, the only 2 that support Ubuntu are Viber and Skype. Viber also supports Fedora, and other RPM based distros. Skype recently came into the folds for Linux. Surprisingly there is a third option called Freetone which is available in the Google Play Store, which means this could become a direct replacement for Google Voice on the Chrome OS. My Toshiba Chromebook will get Google Play Store later on this year. Skype has plenty of consumer recognition, but Viber has very little. I do not use Skype, and probably will not since it is a part of Microsoft.

I am using Peppermint 7 OS on my laptop, so I opted for the Viber Debian download link. I installed the programs, and no secondary Wifi phone number was available. However it does offer free texting and calls to other Viber members.

So I ventured into trying Freetone on my Android Smartphone. Freetone does not have a Linux desktop feature like Google Voice. Yet it does offer a secondary WiFi phone number. I can make phone calls and receive voicemail to this number. If you are a heavy texter, then use Freetext instead to use as a WiFi phone number.

There is one catch to using Freetone or Freetext, the services are not entirely free. The company relies on its users to watch mobile ads so the end user can accrue account credit. This credit is then

used to pay off the WiFi phone use. However these services are tied only to your smartphone. Google Voice can be tied to your smartphone and landline.

So there are alternatives to Google Voice, but none of the services are totally free. There are other alternatives such as Freedompop and Grasshopper in the USA that offer a paid and professional service. Yet in the end Google Voice offers the most services for the price.

## VIBER FOR LINUX

Windows    Mac    Linux

Viber for Linux lets you send free messages and make free calls to other Viber users on any device and network, in any country! Viber syncs your contacts and messages with your mobile device.

- Text, photo and sticker messages
- Group conversations
- Call any Viber user for free
- Full sync between your mobile and your Linux
- Transfer ongoing calls between your mobile and your desktop
- No registration, passwords or invitations required
- Tested on: Ubuntu, Fedora

Viber Debian  
64 bit

Viber RPM  
64 bit





## 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.

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## REVIEWS

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- 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

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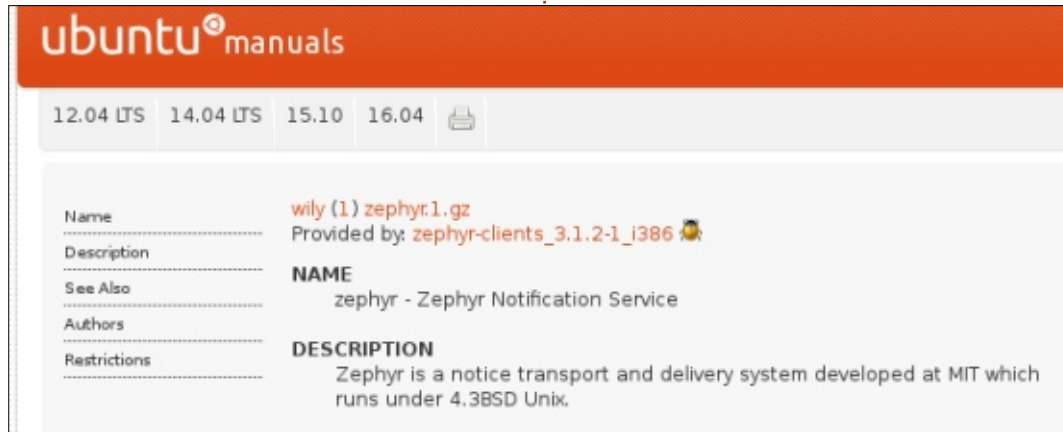




The instant messaging protocol became popular during the late 1990's. However instant messaging developed earlier in the 1960's. Often times, an intranet was enabled to allow instant messaging at computer networks for universities and corporations using peer-to-peer protocols. The first national instant messaging system is the Zephyr Notification Service that arose out of Project Athena in the 1980's.

Zephyr was created at Massachusetts Institute of Technology. The code for Zephyr is heavily tied into Unix. Zephyr is not one single program, but a conglomeration of separate programs working together. It was invented by Ciarán Anthony DellaFera. The code was worked on throughout the 1980s'.

Zephyr arose out of a conversation between DellaFera and a co-worker. It was meant to resolve remote procedure calls on a distributed network. DellaFera recognized the two essential problems to the remote procedure



call: user location and delivering small real time messages. This system is still being used at a few universities. Certain aspects of Pidgin contain elements of Zephyr. Further details about Zephyr can be found at: <http://www.rfrench.org/papers/usenix.pdf>.



**SJ Webb** is a Linux Hobbyist and Research Coordinator. He enjoys fishing, hot rodding, and spending time with his kids and wife. He thanks Mike Ferarri for his mentorship.

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This month, in a departure from the norm, I present a quick HowTo on getting X apps installed on an Ubuntu device.

**DISCLAIMER:** Not all X Apps will work on all devices, and some that do work may not behave well. Most do work fine, but I just want people to know that this is not 100% every time.

In a desktop terminal, install phablet-tools:

```
sudo apt install phablet-tools
```

Connect your device to your PC with a USB cable. Turn on the screen and unlock your device.

On your device you need to enable 'Developer Mode' – this is in: System Settings > About > Developer Mode.

In a desktop terminal, try connecting to your device using:

```
adb shell
```

If you get:

`error: device not found`

try using:

```
sudo adb shell
```

I had to use sudo with adb to get it connected to my M10 tablet.

Your command prompt should change from something like:

```
ronnie@ronnie-desktop:~$
```

to showing:

```
phablet@ubuntu-phablet:~$
```

It means that you are now connected to the device.

First run:

```
libertine-container-manager list
```

You should see only:

```
puritine
```

That's the default container for the pre-installed apps. Don't mess with this container. Be safe and create a new one for playing

around in. This is done using:

```
libertine-container-manager create --id my-container --name "My Container" --distro vivid --type chroot
```

This (libertine-container-manager) will create a new container. In this example:

- The container's ID is my-container (which, of course, you can change)
- The container's Name is 'My Container' (which, again, you can change)
- The distro is vivid (as that's what is on all current Ubuntu devices as I write this article in August 2016).

After a short time, you will now have a new container to play in. For my first test, I wanted to install MyPaint which is a desktop app I use quite a lot.

The command I used (with my puritine2 container) to install MyPaint was:

```
libertine-container-manager install-package --id puritine2 --package mypaint
```

That installed MyPaint into my

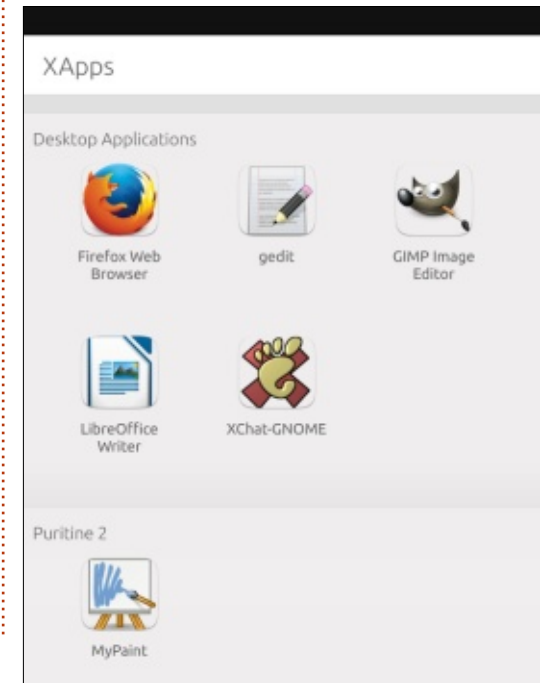
puritine2 container.

**NOTE:** In some cases it may be necessary to add the PPA with this command:

```
libertine-container-manager configure --id puritine2 --archive ppa:achadwick/mypaint-testing
```

Obviously, change puritine2 to the name of your container.

On checking the X Apps scope I see it listed!



# UBUNTU DEVICES

Upon giving it a poke, and to my surprise, it loads!

To uninstall an app, you would use:

```
libertine-container-manager  
remove-package --id my-  
container --package  
PACKAGE_NAME
```

Again, substituting PACKAGE\_NAME for the package name (eg: mypaint)

If you've hidden apps in the X Apps scope, and need a list of what's in a container:

```
libertine-container-manager  
list-apps --id my-container
```

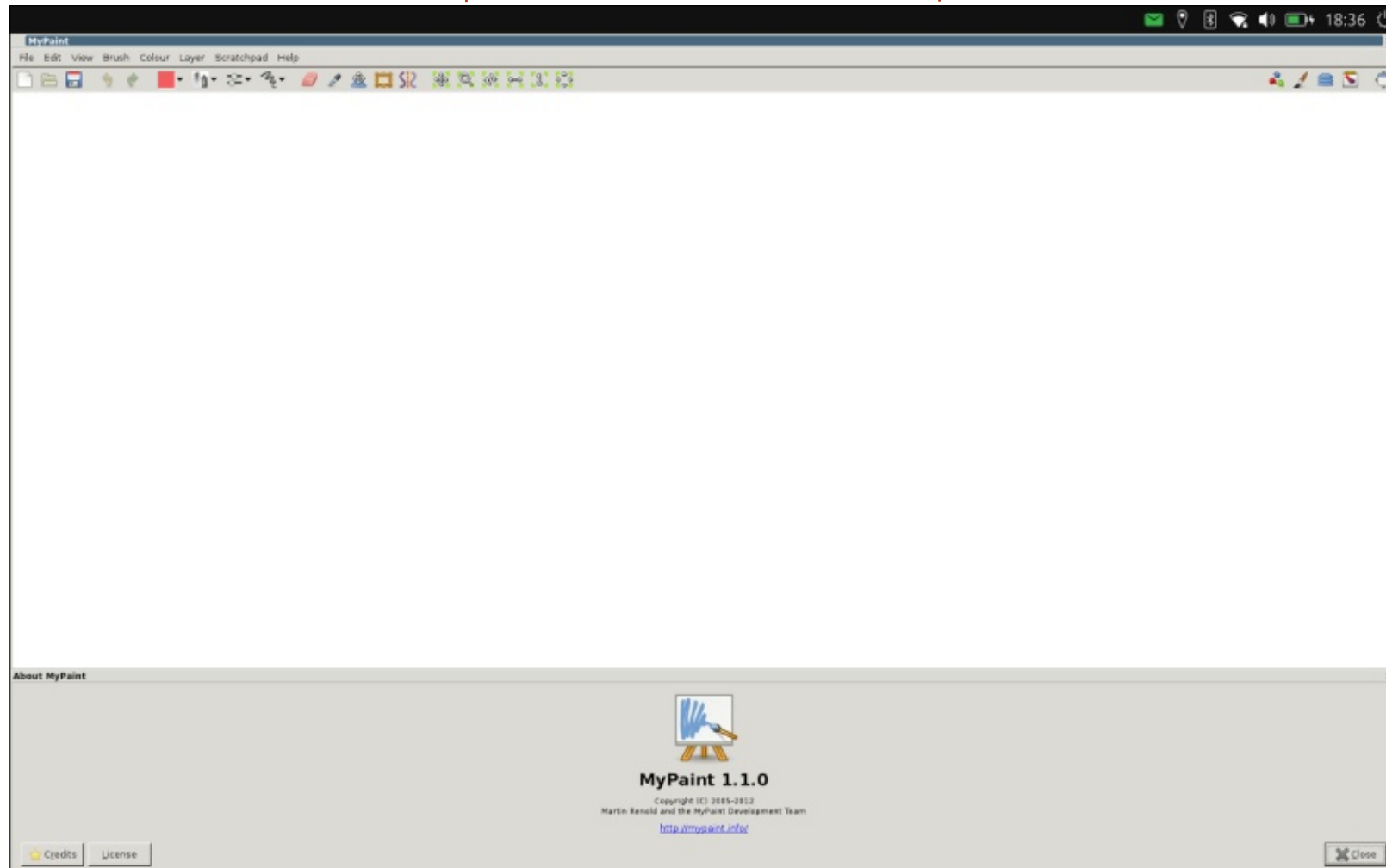
So there you have it. Desktop apps on a mobile device. Incredible!

I'll say it again just to be safe: not every app will work flawlessly, and not all will behave as they should.

## SOURCES:

**Popescu Sorin** and **Sturm Flut** - For bringing this awesomeness to my attention.

<http://kylenubuntu.blogspot.co.uk/2016/07/running-x-apps-on-ubuntu-devices.html> - for the necessary commands, and detailed info.

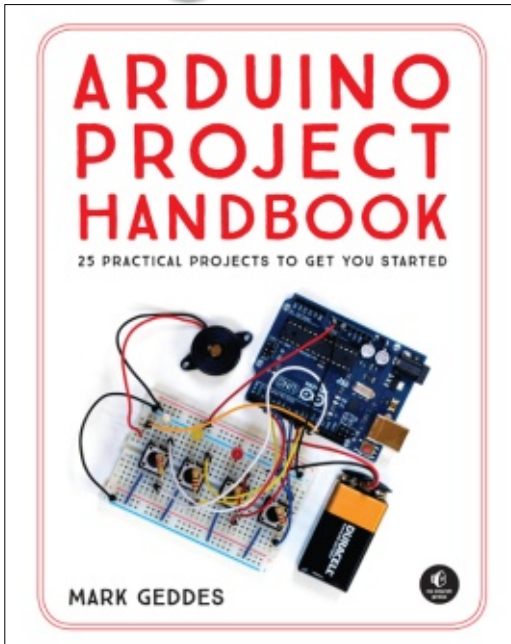




# BOOK REVIEW

Written by Greg Walters

# Arduino Project Handbook



## Arduino Project Handbook - 25 Practical Projects To Get You Started

Mark Geddes  
No Starch Press  
ISBN 978-1-59327-690-4  
July 2016  
272 Pages

Tradition dictates that I withhold my rating of a book until the end. However, throwing caution to the wind and risking a long distance slap in the head from Ronnie, I'm going to give the rating right up front for this book: 5 out

of 5 stars (*slap withheld, as it is a really good book - Ronnie*).

Why risk that slap from Ronnie? Well, I'm that impressed with this book. Mark Geddes and No Starch Press have done a tremendous job with this 25 project tutorial on using the Arduino in (mostly) real-world applications. Each project is colour coded, broken down with required parts, colour photos, and simple step-by-step instructions. While originally written to teach his child the joys of electronics and experimentation, it is completely relevant for anyone looking to learn how to use the Arduino in the real world. With projects ranging from a fortune-telling "Magic 8 Ball Simulator," and a push-button controlled LED, to a model rocket launcher with countdown timer, and desktop servo controlled sentry gun with ultrasonic detection, anyone with a desire to learn can benefit from this book.

Not only do you get a complete parts list for each project on the 2nd page of the project, but you also get a list of the required

libraries. Each project includes a "how it works" section, a detailed breakdown of the build process with photos, and a sketch that will pull it all together.

My favorite project so far is the "Ghost Detector", which is an easy-to-build electromagnetic field detector. I'm also looking forward to the "Build your own Arduino" project.

Mark has also provided in the Appendix, a list of all the components used in the book, the model number of the sensor or item (including the RC V959 Missile Launcher), which project(s) they are associated with, and then a list of retailers that can provide the components.

If you are interested in the Arduino at all, this is a must-have book.



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Swift Staffing is a family-owned contract and temporary staffing business. At first glance, we seem similar to many small businesses, but if you look more closely, we have a difference that gives us an edge over the competition: our state-of-the-art technology. The applications we've adopted enable us to operate at higher volumes, provide better service, and achieve higher revenue levels than ever in our 27-year history, while using fewer people to do it. In fact, we are much more efficient now than we were just five years ago.

So what's different about a small business running better on a strong technology platform? Not much, except for the fact that we pay next to nothing for it.

Now I'd like to offer the lessons I've learned to other business owners—and if you have questions about what you read, contact me directly.

## THERE HAS TO BE A BETTER WAY

In 2005, we were a Windows-centric organization—as are most small businesses today. We were using applications like Microsoft SQL server for our databases, Exchange for our email, Windows on desktops, and so forth. Like all responsible businesses, we stayed current on our licensing and upgrades. As a result, we incurred regular, recurring costs for our software, but that was not the reason we began exploring options. More and more, we were having many minor and some very major headaches with servers and other software crashing for one reason or another. As a technology enthusiast myself, I thought there had to be a better way. Instead of constantly renewing licenses and upgrading to newer versions in order to continue vendor support, I started looking into open source software alternatives, and I've never looked back.

When the project started, my goal was to resolve pain points and

to stem the flow of tech support dollars spent fixing the problems—not to transition nearly every technology function in the company to open source. Yet along the way, I found that there are excellent applications to replace any commercial software—from productivity suites like OpenOffice, to accounting, e-commerce or inventory management and more.

The list of applications is steadily increasing, so you'll have a greater variety to choose from than I did. I recommend business owners select popular programs with a large number of users. If an application has a large user group, the program is almost certainly stable. Also, the open source user group communities can be very helpful information resources, so the larger a program's install base, the better. Please note, even though the vast majority of open source software is free (very nearly), some developers offer support services for a fee.

## FIRST, GET AN OPEN SOURCE-SAVVY IT PERSON INVOLVED IN THE PLANNING

From one small business owner to another, take my advice: when you transition your business technology to open source, you will want advice from an IT expert. Your IT consultant will help you inventory your current technology environment, develop a list of open source alternatives, and craft a staged implementation plan. You won't need IT support eight hours a day, 40-hours a week, but unless you are a highly technical person, you will run into issues you'll likely not be able to address yourself.

If you don't have in-house expertise in this area, Swift Staffing can contract IT resources to replicate what we've done. If you were fully committed to transitioning, it might be done in as little as a few months for a small office; however, I advise business owners to take a measured approach, transitioning the back end technologies, like server

## MY STORY

software, before introducing changes to your desktops.

### BEFORE YOU GO LIVE: PREVIEW CRITICAL APPLICATIONS VIRTUALLY

Your data is your business; so this should go without saying, but: do not sacrifice data security for a speedy transition. When we went to transition Swift Staffing's Enterprise Database server, it contained 16 years of our data. This server is a critical, core piece of our business, so it was key to our continuity that everything be correct. We made this move very slowly, running dual applications for six months just to be sure everything was right.

In Swift Staffing's case, we took the same pains when we transitioned to an open source accounting system. We'd been using a widely recognized commercial system for many years. Now we use NolaPro, a very full-featured, free, multi-user, web-based accounting program, but before we made the decision, we conferred with our accountant to be sure it would give us the information we needed. We ran

this system in a dual environment for six months as well. NolaPro eventually eliminated the need for outside payroll services.

By testing in a virtual server environment like Vmware, Virtualbox, or KVM, you can confirm that applications and hardware work well together. There is a real possibility of crippling your existing systems, so make absolutely certain that there are no technology conflicts before you flip the switch from commercial to open source server software.

### INTRODUCE OPEN SOURCE APPS ON THE BACKEND FIRST

Change can be threatening, but often it is the fear of change that is more problematic. We recommend making the first transition on the backend. Changes to your back end file servers or mail server should be transparent to your employees or customers, but will give you the satisfaction of having made a positive step to getting control over your IT environment.

If you have not looked into Internet phones, also known as voice over IP (VOIP), you should

immediately. This is another transition that can save a significant amount of money over traditional phones and add a host of new features. The open-source VOIP solution that we chose is PBX in a Flash, which uses Asterisk. At Swift Staffing, we save close to \$9,000 a year using VOIP.

### TRANSITION DESKTOP APPLICATIONS IN STAGES

Many of the most popular open source applications work well in a Windows environment. Start your desktop transition by introducing programs like the Mozilla Firefox web browser and Thunderbird email. Your people will find them more secure and just as easy to use – if not easier – than familiar commercial programs.

Next, consider installing LibreOffice, an office productivity suite featuring word processing, spreadsheet and presentation programs that are largely compatible with MS Office. OpenOffice was developed by Sun Microsystems, which was recently acquired by technology giant, Oracle Corporation. LibreOffice is a "fork," or spin-off, of OpenOffice.

Your employees can get used to the new program on the familiar Windows desktop, and when you transition to a new operating system, these programs look and behave just the same.

### TRANSITION TO OPEN SOURCE OPERATING SYSTEMS AND OTHER SPECIALIZED APPS

We use Ubuntu as our primary operating system. To get our people used to its look and feel, we instituted a dual-boot system, which enabled users to select between Ubuntu and Windows while they developed familiarity with the new system.

We also gave our employees copies of Ubuntu on DVD to install and play with on their home computers. This is a flexibility that commercial software does not allow. Our users were able to open Ubuntu from the disk, and use it fully without installing it on their home computers.

# MY STORY

## BE OPEN TO EMPLOYEE CONCERNS AND OFFER TRAINING

A change in technology is a change in culture, and as is true with all major change, transitioning to new software is easier with employee support. While you see the benefit clearly, don't assume the same is true for your employees. Don't force people through the transition; make them want to change.

Most people fear the unknown, and in a competitive job market, your employees might fear that workplace skills will not stay current using open source tools. Fortunately, you can assure them that more and more businesses are switching to open source tools, and the trend is likely to make them even more marketable.

You should also consider bringing in resources to train key staff, who can then act as trainers for the rest of your people.

Enjoy the benefits!

Swift Staffing saw a dramatic reduction in technology spending

in the first year after the transition, cutting more than \$35,000 from a \$41,000 expense. The benefits to your business will depend on how you are using technology today. On thing is sure: Whether you are a start-up or a small business with a long history, open source technology should be part of your future.



**Ron Swift** is the President and CTO of Swift Staffing.



In a recent statement (commented here: <http://fullcirclemagazine.org/2016/05/04/no-ubuntu-back-doors-windows-and-mac-migrations/>) Mark Shuttleworth spoke about increasing the size of Ubuntu desktop images - those ISO Live CD files we download to install our system. The current limit is nominally at 1 GByte, and should go up to 2 GBytes or more. Is this a rational decision – or not, and what does it mean for us users?

## MODERN PARTITION SCHEMES

In the first place, perhaps it may be useful to take a look at the hard drive layout used by the system, once installed. Most desktop and laptop computers - those used directly by individuals as opposed to servers - have a hard drive with several partitions. Ubuntu can be installed in a single partition (e.g.: /dev/sda1), especially if the btrfs filesystem and subvolumes are used. In most systems, however, partitioning schemes use several

partitions. One partition for the system, and a second for user data is commonplace:

```
/dev/sda1 -> mounted on / =
system partition

/dev/sda2 -> mounted on /home
= user data
```

On servers, typically other directories (such as /var and /opt) will reside on further partitions, making system administration easier and more foolproof since errors that affect one partition are more easily confined to it. An example would be running out of space, which can happen with /var if a daemon runs away on us.

This tendency to split the file system up into distinct partitions is also applicable to devices. On a modern mobile device, the internal Flash-based storage space is organized in a similar fashion to a computer's hard drive, with a partition table and separate partitions for different purposes. For example, a typical Android-based device with 32 GBytes capacity was structured as follows:

```
$ df
Filesystem      Size
Used   Free   Blksize
/system         343M
290M    52M    4096 -> APP =
/dev/block/mmcblk0p3
/data          27G
13G    14G    4096 -> UDA =
/dev/block/mmcblk0p10
/system/vendor  343M
157M   185M   4096 -> FLX =
/dev/block/mmcblk0p6
```

Here, we can identify the Flash device used as /dev/block/mmcblk0 (Memory Block device 0), where partition 3 is taken up by the operating system itself, partition 10 is user data, and partition 6 holds vendor-specific additions such as additional applications.

Such a layout may seem excessively complex at first glance. However, it does retain the advantage of being able to alter just one of the partitions without affecting the others. A system upgrade, for instance, may alter only data in partition 3 (/system), while affecting neither user data nor vendor-specific applications.

Ubuntu Snappy and Touch installations are organized along

the same lines. For example, a 4 GByte Ubuntu Snappy layout was as follows:

```
/dev/sda1 (8M) = GRUB area,
flagged bios_grub, "grub"

/dev/sda2 (63M, 52M used,
fat32) -> /boot/efi = boot
partition, "system-boot"

/dev/sda3 (976M, 612M used,
ext4) -> / = system area,
"system-a"

/dev/sda4 (976M, 1.3M used,
ext4) ->
/writable/cache/system,
"system-b"

/dev/sda5 (1.6G, 40M used,
ext4) -> /oem = application
area, "writable"
```

Here, the main system hard drive /dev/sda contains two system partitions (2 and 4), while partition 5 is for user-installed applications.

## UBUNTU SYSTEM IMAGES

What, precisely, is an Ubuntu image? In essence, we are speaking of a file system, similar to what would be found on a computer's system hard drive, but packaged into a single file instead of





occupying sectors spread over a physical hard drive. Basically, we have a lot of files within a single file. This has a few advantages. A single file may be downloaded, instead of having to synchronize a complete file system with all its directories and subdirectories. It is also easy to compress this file, taking up less space. This is what already happens within a ZIP or RAR compressed file. In the traditional UNIX compressed file, two distinct tools are used: tar to group together directory contents into a single file, and then either gzip or the more modern bzip to compress it, giving the .TAR.GZ (.TGZ) or .TAR.BZ extension combinations.

Typically nowadays, a compressed system disk occupies about 500 MBytes to 1.5 GBytes, which decompresses to 2 - 4 GBytes. Naturally, the actual numbers depend on the file system contents. Thus, the rationale behind Canonical's decision is mostly the wish to include more software packages than previously available on the installation image itself.

One may ask for what reason an Ubuntu system image is not

distributed in one of these compressed file formats. This would actually be possible, at least as far as the file system itself is concerned. However, the end result, once downloaded, would somehow need to be made bootable so we can actually start the computer from it, and launch the installation process. Further information must be included within the compressed file so that the BIOS can detect and boot the image, once written to a physical medium (optical disk or USB drive).

The simplest tool to do this is an IMG file. This can be seen as a byte-for-byte clone of an existing hard disk. The distribution manager creates a working system or "Gold Master" (in Apple's terms), which is then cloned into a file for distribution, usually in compressed form. On the receiving side, the user will decompress and copy back the bytes from the IMG file onto the chosen support. This works well when working with USB drives as a boot medium for a computer, or when flashing a mobile device such as a tablet or phone.

The IMG file can be an image either of a single partition, or of a

complete drive with several partitions and a partition table to identify each. In most cases, an IMG file for an Ubuntu bootable USB contains a single partition, unlike OpenSUSE images which contain two. IMG files for flashing devices with Ubuntu Touch have their own particularities, as evidenced here:

```
# file vivid-preinstalled-  
boot-i386+generic_x86.img
```

```
vivid-preinstalled-boot-  
i386+generic_x86.img: Android  
bootimg, kernel (0x10008000),  
ramdisk (0x11000000), page  
size: 2048
```

```
# file vivid-preinstalled-  
system-i386+generic_x86.img
```

```
vivid-preinstalled-system-  
i386+generic_x86.img: Android  
sparse image, version: 1.0,  
Total of 51200 4096-byte  
output blocks in 1698 input  
chunks.
```

ISO files are another beast altogether. ISO files are designed as a byte-by-byte copy of the contents of an optical disk, be it CD or DVD, which gives them several particularities. One is size limits: once upon a time, CDs were limited in capacity to 700 MBytes. The ISO 9660 standardized the filesystem used, with quirks that

harken back to the the MS-DOS era such as filenames limited to the 8.3 format (eight characters for the file name, three characters for the extension); extensions of the standard allowed longer filenames. The "El Torito" extension, for example, allowed CDs to be used as a boot medium for computers. It should be noted that this was not a feature of the original filesystem, but rather an addition that at first inserted a floppy-disk image of 1440 kBytes that computers detected and booted from.

Later DVD formats evolved somewhat, with capacities ranging from 4.37 GBytes (DVD-5 single-layer) to 7.95 GBytes (DVD-9 double-layer). Disks with higher capacities have been produced, but have not really gone mainstream for computer applications. The more modern Universal Disk Format (UDF) filesystem is now commonplace.

These restrictions on the physical medium and file system -with the desire to remain compatible with older computers- have limited the freedom of movement of the producers of GNU/Linux system images. The image file needs to be produced in

precisely such a way as to be bootable on a variety of systems - and the more recent EFI BIOS has complicated matters just a tad more.

To simplify things a bit, what one finds in a recent Ubuntu ISO file is the following:

```
# mount -o loop ubuntu-16.04-  
desktop-amd64.iso /mnt  
  
mount: /dev/loop0 is write-  
protected, mounting read-only  
  
# mount | grep ubuntu  
  
ubuntu-16.04-desktop-  
amd64.iso on /mnt type  
iso9660 (ro,relatime)  
  
# df -lh | grep loop  
  
/dev/loop0      1.4G  1.4G  
0 100% /mnt  
  
# ls /mnt  
  
boot dists install  
md5sum.txt pool  
README.diskdefines casper  
EFI isolinux pics  
preseed ubuntu
```

The basic file system is the ISO9660 compatible with the original CD format, though grown in size from the original 700 MByte limit, up to about 1.4 GBytes. The directory structure contains several specific directories such as

isolinux for the Isolinux boot system for older BIOS, and EFI for the newer EFI-capable computers. The one that really concerns us, however, is the /casper directory. It contains the main contents of the ISO image such as the Linux kernel (vmlinuz.efi), the initial RAM disk (initrd.lz), and also a very large file, filesystem.squashfs.

```
# ls -lh /mnt/casper/  
  
-r--r--r-- 1 root root 1.4G  
apr 21 00:25  
filesystem.squashfs  
  
-r--r--r-- 1 root root 26M  
apr 21 00:25 initrd.lz  
  
-r--r--r-- 1 root root 6.7M  
apr 21 00:25 vmlinuz.efi
```

This SquashFS file is the actual file system that is decompressed in RAM and mounted on / within the Live CD upon boot. We can see this from within the Live CD itself:

```
ubuntu@ubuntu:~$ mount  
  
/dev/sr0 on /cdrom type  
iso9660 (ro,noatime)  
  
/dev/loop0 on /rofs type  
squashfs (ro,noatime)  
  
/cow on / type overlay  
(rw,relatime,lowerdir=//files  
ystem.squashfs,upperdir=/cow/  
upper,workdir=/cow/work)
```

The first entry here is the ISO image itself, giving access to all its files - including the /pool directory. Naturally, it is mounted read-only "ro", and no changes can be made to its contents from within the newly booted Live CD. /rofs is the SquashFS, still in compressed form. This is also read-only, by design as well as the fact that it resides in an ISO image.

Finally, the /cow bit is the fascinating piece of technology that makes it possible for the complete Live CD construction to work. In a GNU/Linux system, some parts of the file system need to be mounted read-write - otherwise, a modern system simply will not boot up completely. /cow implements an overlay file system, in which two separate file systems are combined. The lower part is comprised of files and directories that form the base of the file system, and that will not be modified during normal execution. These reside in the SquashFS. On the other hand, an upper layer holds the files and directories of the root file system that have changed during execution. This can be seen as similar to a delta backup, where only changes from an initial state need to be

recorded. The overlay system makes the fact that a file resides in the lower or the upper layers completely transparent to the user.

On a system booted from a Live CD that is, in fact, a physical DVD or an ISO image booted in a virtual machine, the boot medium cannot be altered. In these cases, the upper part of the overlay file system is maintained in RAM, and will be lost when the machine is shut down. If, on the other hand, the boot medium is a writable device such as a USB stick, persistency can be implemented - by storing the upper layer in a special file on the device, and changes can be preserved from one boot to another.

## SYSTEM INSTALLATION

Once the Live CD has been booted, the user can go on to install the system onto the computer's hard drive. What actually happens is quite different if the system image is a server image, or a standard desktop image.

In the case of a server image,

Ubuntu Server goes the route of the traditional Debian install ISO. In this case, a minimal bootstrap environment is transferred onto the computer's hard drive, and then software packages in the DEB format are installed on that drive using apt-get commands much in the way an administrator could do by hand. The only difference is that many of these packages are files located on the CD itself, within the /pool directory. These may be supplemented by other package files brought down from the repositories on the Internet if a network connection is available.

On the other hand, an Ubuntu desktop image contains a large selection of software, already installed in the SquashFS file system: applications such as Firefox, Libreoffice and the desktop environment itself (Unity, Gnome or whatever). It would be wasteful to have these programs in software packages on the CD as well, so a different installation strategy is preferred. The main root file system is simply cloned over on to the computer's hard drive, and then specific changes are performed - such as creating new user profiles, tweaking GRUB, etc.

Even so, when installing a desktop system, an attentive user can see how the installation process finishes up by downloading software packages with newer versions of some applications if available, and also removing some software packages such as language packs that the user has not chosen.

### SOME FINAL THOUGHTS

When Mark Shuttleworth was speaking about having large installation images (ISO files) for future versions of Ubuntu, the basic aim seems to be to make a larger collection of software available straight from the installation medium. This would have some consequences, depending on the precise way in which the ISO file is laid out.

On the one hand, the amount of applications within the Live system can be increased. This would mean a larger SquashFS file - but also a larger amount of space used in a freshly installed system's hard drive. In this day and age, this is probably not a concern for most people; going up from Ubuntu's 3.5 GByte disk usage on a new

system to -let's say- about 5 or 6 GBytes would be feasible nowadays even on machines with restrictions on disk space, such as SSD hard drives or virtual machines. These applications would be available from the Live CD environment, and also on the new system once installed, which would make things easier both for users who wish to explore software choices that they are perhaps not familiar with, or for users with constraints on downloading software packages from the Internet. However, it could also be an inconvenience for "normal" users, whose computers would be updating a larger selection of software on a regular basis, unless some of these applications were promptly uninstalled. Imagine, for instance, having both the Mozilla Firefox and Google Chrome browsers installed: both these programs are rather large, and regularly updated. Most of us opt for either one or the other. Is there a real reason to download upgrades for both on a monthly basis?

Another option would be a hybrid approach. The basic SquashFS would contain just the basic system and desktop

manager, with a larger selection of software packages available in DEB files within the CD image's /pool directory. Some sort of selection procedure would then need to be put in place during installation - as in the current Ubuntu Server. This would mean only software that the user really wishes to install ends up on the final system. However, it would also mean that some of this software would not be available from within the Live environment, and could not be tested out before installation to the hard drive. The installation procedure would also require a supplementary stage, which may or may not be agreeable to first-time installers.

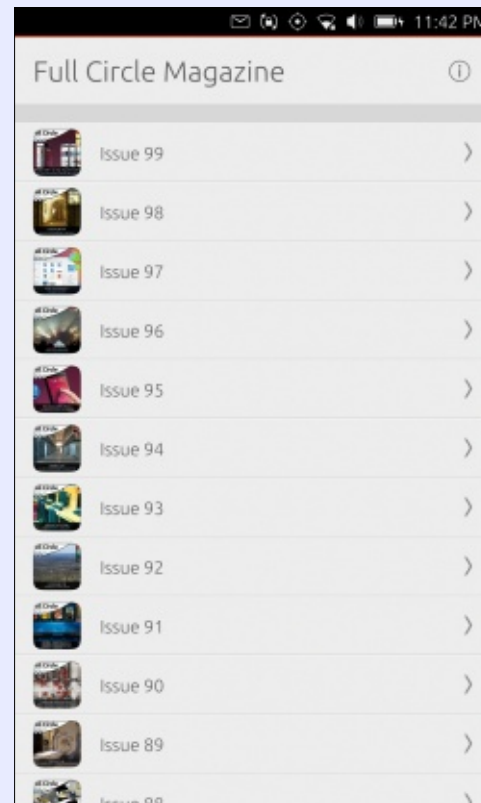
Which way Canonical goes on this one will obviously depend on their take on which alternative is best for most users. The beauty of the ISO file structure that has evolved to create the Live CD we all know is its flexibility. Different software choices in the SquashFS give us, today, the means to build the installation images for the different flavors of Ubuntu: Ubuntu itself with Unity, Kubuntu, Xubuntu, Ubuntu-gnome, etc. Remastering the SquashFS with a different set of applications

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installed is, in itself, not a big deal. So it would be conceivable for Canonical to supply not one, but several desktop installation ISO images: one with a bare system that the user will deck out with applications from the repositories online, another with all the bells and whistles already installed and ready to test, a third with several desktop manager options (Unity + Gnome, Unity + XFCE + MATE), etc.

In any case, it seems rather certain that one of these images will be chosen over the others and proposed as a "main" image, the go-to ISO file to download for users unsure of their choice and its implications. The Ubuntu distribution has always been about making it simple for new users; it would perhaps be best to continue on this track.

## THE OFFICIAL FULL CIRCLE APP FOR UBUNTU TOUCH

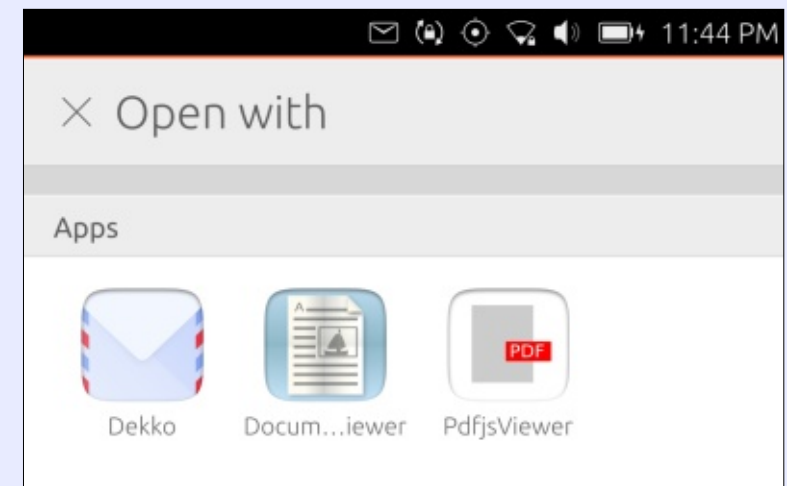
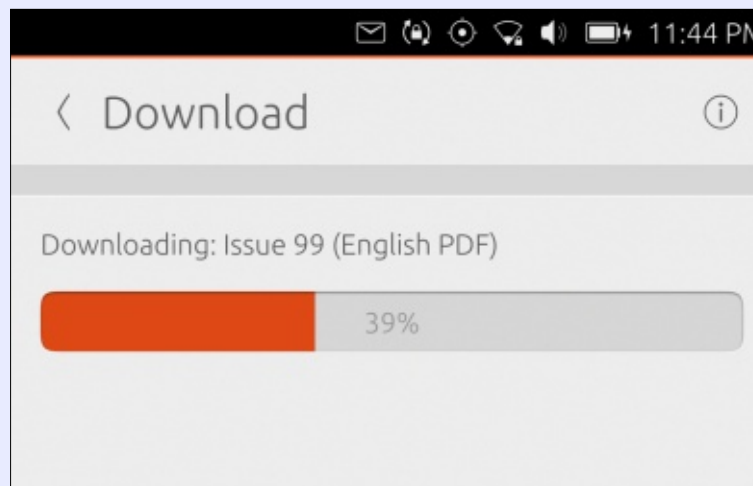


**Brian Douglass** has created a fantastic app for Ubuntu Touch devices that will allow you to view current issues, and back issues, and to download and view them on your Ubuntu Touch phone/tablet.

### INSTALL

Either search for 'full circle' in the Ubuntu Touch store and click install, or view the URL below on your device and click install to be taken to the store page.

<https://uappexplorer.com/app/fullcircle.bhdouglass>



**Alan** holds a PhD in Information and the Knowledge Society. He teaches computer science at Escola Andorrana de Batxillerat (high-school). He has previously given GNU/Linux courses at the University of Andorra and taught GNU/Linux systems administration at the Open University of Catalunya (UOC).



## 32-BIT

I would like to make a comment on one of the articles from FCM#111 regarding the news article and suggest some 32-Bit Ubuntu alternatives. The article was interesting but it did not mention any of the alternative operating systems that would be suitable on 32-bit computers.

I have tried several, including Peppermint—a very popular OS—but the best one I personally have found is antiX. This system is very different from Ubuntu and it operates very differently, but it is lightweight and very fast (there is an excellent and very responsive forum which I have used when I had questions). I have an "ancient" computer—a Toshiba Satellite 1905-S277—that I purchased in March 2002. It originally came with the first version of Windows-XP installed and has a Pentium 4 processor along with 512 MB of RAM.

Obviously nothing can perform miracles with this computer, yet,

with antiX-16 installed, it does function and is usable (Peppermint 6 would not install to this computer.) I use it mostly to play Internet radio stations.

I also use antiX-16 on a ZaReason Teo netbook and this OS has brought this low-powered computer back to life.

I also own a couple of 32-bit Acer Extensa computers purchased as recently as 2008, which also have 32-bit processors. They are both in excellent physical condition and I wish to continue to use them.

This operating system is certainly worth investigating, at least in my opinion, by anyone who has an otherwise physically functional older computer. antiX has a couple of other "flavors" including a 64-bit installation.

I like it.

I think that Ubuntu's decision to abandon 32-bit support is unfortunate. Ditto for the other distributions that have chose the

same route. After all, some years ago, one of most GNU/Linux distributions' selling points was that you could continue to use an older computer which would no longer support Windows. Some of our distributions seem to have lost sight of that advantage (which is, again in my opinion, a major one).

**Lawrence H. Bulk**

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## 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.



# Q&A

Compiled by Gord Campbell

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'm trying to install some genealogy software and I'm having a little trouble with it. It's a .sh file. I make the file executable and then it says it requires Java 6.

**A** (Thanks to *QIII* in the Ubuntu Forums.) Java 6 is past End of Life and was rife with security problems long before that.

Don't use it and don't use anything that depends on it. Whatever your script is for, it has not been maintained and is not safe.

**Q** I have noticed that every morning when I get up, I have multiple browser (chrome) windows open, half of them with failed logins to my accounts (godaddy, amazon, paypal, etc). I had briefly enabled remote desktop, but had since disabled it. I have blocked root ssh to my box, as I am seeing thousands of failed logins (dictionary attack, I am guessing).

**A** (Thanks to *QIII* and *DuckHook* in the Ubuntu Forums) You may have "disabled remote access" -- except for whatever back doors an intruder has opened. Take it off the Internet immediately.

It is my humble opinion that the only recourse when your machine has been compromised (assuming your description is accurate, it surely has) is euthanasia. Nuke it hard and start over. That is the only option I would consider. You simply cannot trust that you can find every evil thing in every corner and remove it.

Take your computer offline. Install a new system on another disk, even an external USB stick if you have to. Then salvage whatever data you need from your old install, making sure not to boot into it. Also, make sure that it is pure data only: photos, music, text, etc. No apps, scripts, system files or config files permitted. Zilch. Nada. Resist that urge to salvage the games directory, for example. Once you have a new and reliably hardened install, change your

passwords to everything. Inform your bank and other important institutions. Assume that everything you connect to has been compromised. This is an occasion for tinfoil hats and aliens-are-everywhere-level paranoia.

**Gord adds:** if you have a router, reset it to factory settings, then set up new strong passwords. If you don't have a router, get one, and insert it between your modem and your computer -- and do not set up any port forwarding.

**Q** I installed Netbeans via Synaptic and it's version 8.1, but I noticed that I don't have JavaFX as an option for a new project. How do I install JavaFX, and then I will want to install Scene Builder if it doesn't install with FX.

**A** (Thanks to *DaviesX* in the Ubuntu Forums) Installing the package from the official site always works for me: [netbeans.org](http://netbeans.org)

**Q** I'm new to Ubuntu. Now that it's installed, would someone suggest a procedure to follow so that I can back up my installation and then restore it if I need to. Ideally this would be a disk image.

**A** (Thanks to *DuckHook* in the Ubuntu Forums) FWIW, I don't back up the system. I've found over the years that it's not worth the trouble trying to clone and then reinstall the operating system because the restore process is often brittle, will restore you to an indeterminate previous state, and sometimes drags in the cruft (or mess) that caused the system breakage in the first place. Especially in light of the fact that:

- After many installs, I find that an install from scratch takes no more than 40 minutes, tops,
- I now know exactly what config files to backup/restore, and
- I keep a simple log of all post-install apps,

I prefer having a pristine system to start over again. It's the data that is important, and that I back up two independent ways, with

## Q&A

both on-site and off-site storage.

(**Oldrocker99** suggests `grsync` to back up the `/home` folder.)

**Q** Can I make `conky` appear in every workspace?

**A** (Thanks to **yetimon\_64** in the Ubuntu Forums) You need to add the "sticky" hint under the "own\_window\_hints" line in the `.conkyrc` file. For example:

`own_window_hints  
undecorated,below,sticky,skip  
_taskbar,skip_pager`

**Q** What does Wine do and what does it not?

**A** (Thanks to **howefield** in the Ubuntu Forums.) The best place to have that question answered has to be the Wine website and the application database that you will also find there.:

<https://www.winehq.org/>  
<https://appdb.winehq.org/>

**Q** Currently I am dual-booting Windows 10 1511 & Ubuntu

16.04. My question is, will the anniversary update on Aug. 2nd, affect the grub bootloader?

**A** It probably will not affect the grub loader, but it is always prudent to have a CD of Boot Repair -- and an image backup of your Windows installation.

### TOP QUESTIONS AT ASKUBUNTU

\* Forgot passphrase (encrypted hard drive), how can I use my computer again?

<http://goo.gl/VFNzWC>

\* What happens when I use 'dd' to overwrite the disk from which Ubuntu is running?

<http://goo.gl/xCWvCC>

\* How do I uninstall Ubuntu from a computer?

<http://goo.gl/Shwff0>

\* How to check if my Ubuntu is placed on SSD?

<http://goo.gl/TcPeZP>

\* If I clone a hard drive using the 'dd' command, will it also clone the free space and information about

deleted files?

<http://goo.gl/p7psMV>

\* Is there any command-line software to create e-books from scratch in Ubuntu?

<http://goo.gl/IAHefP>

\* How do I upgrade from 14.04 LTS server to 16.04.1?

<http://goo.gl/jmqZK9>

\* Is it possible to set Ubuntu a way that it does not shutdown before a script is finished?

<http://goo.gl/cJG6JN>

### TIPS AND TECHNIQUES WHY NOT?

**I**n June, my ward played the piano at a talent show at his school. As it turned out, I sat beside my next-door neighbour, whose daughter was dancing in the same event.

A few years ago, I bought a Samsung F30 video recorder, which is competent rather than wonderful, but its zoom function is much, much better than my phone. I recorded the two "interesting" performances, after a pan of the

audience to "set the scene." My estimate is that the audience included 320 school kids, 25 teachers and 55 parents, a nice round 400 in total.

Once I was back home, I created titles and credits using Cinelerra. Then I used Devede to create an iso, and k3b to burn it to the media. My neighbour was delighted to get a DVD with her daughter's performance.

The DVD is far from professional, but it shows the essence of the performances.

My position is simple: "these tools are available for free, why not learn to use them?"



**Gord** had a long career in the computer industry, then retired for several years. More recently, he somehow found himself "The IT Guy" at a 15-person accounting firm in downtown Toronto.

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# AVAILABLE WORLDWIDE





Improving a game's graphics without having a negative effect on the performance or frames-per-second (FPS) can be a very daunting task. Unless you know what you're doing, there are greater chances of rendering the game un-playable while trying to make it look more appealing to the eye. There is a fine line to be crossed which, if you know how to navigate your way through it, can yield some amazing results. If you don't know which settings to tweak and which to leave alone, then this guide should help you take your game to the next level while keeping its performance almost unaffected. Before diving into your favorite game's graphics settings menu, it might help to know a little about what's going on under the hood.

## GRAPHICS DRIVERS & RENDERING APIS

Until only a few years ago, it was nearly impossible to play AAA game titles on Linux. The main reason for a lack of games was due,

in part, to the inadequacy of graphics drivers. Other factors were involved as well, such as OpenGL not being as compatible for gaming as Microsoft's DirectX, but times are slowly changing. We now have a growing catalog of games available on Linux, with older titles being ported over as well as new games being released on Linux at the same time as they are released for other platforms. With the release of Vulkan, the successor to OpenGL, we should see an even greater influx of games released on Linux. It's expected that many game developers will see the benefits in using the Vulkan (API) instead of DirectX – which should eliminate the need for multiple ports needed for different platforms as Vulkan would be universal regardless of what platform you're using. Any game that uses Vulkan has the potential of being released for Linux at the same time as being released for other consoles. Essentially, this would mean that games could be developed to run on PS4, Microsoft Windows, Xbox One (if Microsoft allows Vulkan to

run on it), Android & Linux, without the need for a port. Vulkan supported games are already beginning to appear, and we expect that number to grow at a rapid rate within the next couple of years. As of August 2016, a couple of top notch games that you can play using Vulkan (instead of OpenGL) are The Talos Principle and Dota2, among others.

Another factor to consider is your graphics drivers. It should go without saying that you will have a better experience if you use proprietary drivers instead of the default open source drivers that come standard with most Linux distributions. I'm not going to go into the details on how to install the correct proprietary drivers, but I'll leave you with some basic understanding of what you need and what you don't. If you have a Nvidia graphics card, then you'll want to use the nvidia-graphics-drivers instead of the Nouveau open source driver that your system came with. If you're using an AMD/ATI graphics card, you'll want to use the fglrx proprietary

driver from AMD instead of the open source Radeon driver from AMD that comes standard with most distros. For more detailed instructions, please refer to the Ubuntu Community Video Driver How-To which contains information for AMD, Nvidia and Intel drivers.

## RESOLUTION, REFRESH RATE & VSYNC

Having resolved your driver issues, let's now delve into the mysterious, mystical and mythical world also known as the graphics menu settings.

One thing to keep in mind – while we explore the settings we can change and the ones we shouldn't – is that not all settings are called the same across all games. Three games may very well have three different names for the same exact graphics setting. So, if the suggestions I give you here have different names from what your game might have, it is to be expected. For the most part, most of the standard settings have

somewhat similar names.

First things first: most games will give you the option to run either “Windowed” or in “Full Screen Mode”. If your graphics card & CPU can handle it, then you want to go with the “Full Screen Mode” so that you get the best experience possible. Then there's the Resolution which should give you a few different options such as 1920x1080, 1280x720, or 720x480, among others. For this choice, you want to find out your monitor's native resolution and make sure that you select that in the game – if it wasn't already selected for you upon initial game run. Along the same lines as Resolution is the Refresh Rate, which should also match your monitor's refresh rate. These numbers will be something like 24Hz, 60Hz, etc. Although you can change this setting, you want to leave it as is, especially if you're going to be using VSync, otherwise VSync won't work properly.

So now, on to one of the most crucial settings that you definitely want to enable: Vertical-sync, also known as VSync. Vertical-sync is basically setting a limit to how many frames-per-second your GPU will allow. Although it would seem

that you'd want more frames-per-second for a better experience (which makes sense), it's actually a good idea to put a cap on it. The reason for this is that, without using VSync, your GPU will try to put out as many frames-per-second as it can which can lead to system instability and perhaps even your GPU overheating. By placing a limit on the FPS output from your GPU, you're securing system stability as well as ensuring that your Frame Rates are synchronized with your Refresh Rates, otherwise you'd have what's called Tearing, which is an unwanted screen glitch.

## ANTI-ALIASING

This is perhaps the one setting that will make the biggest difference in both performance as well as the appearance of the game. Rather than go into a very detailed explanation of what anti-aliasing is, which you can find by going to

<https://en.wikipedia.org/wiki/Anti-aliasing>, I'd suggest you watch a youtube video which, rather than explain it with complex jargon, does a good job at showing you what it is. There are multiple different types of anti-aliasing,

such as SAA (Spatial Anti-Aliasing), SSAA (Super-Sample Anti-Aliasing), TAA (Temporal Anti-Aliasing), among others. In a nutshell, anti-aliasing is what helps get rid of jagged edges in images. It's what helps some images look blurry, smooth & more realistic instead of jagged, square and artificial, which is what you want to avoid. If you can afford it (if your graphics card can render it), you definitely want to enable some sort of anti-aliasing as this will have a dramatic effect on how your game looks. However, you may also notice there's a performance hit if you use one of the fancier types of anti-aliasing. For the most part, you can get away with using FXAA (Fast Approximate Anti-Aliasing) if it's an option for you, but feel free to try out some of the other options. SSAA will probably give you the best appearance but it will also give you the greatest performance hit.

## TESSELATION & AMBIENT OCCLUSION

There are some settings that are either ON/OFF or that will give you a Low/Medium/High/Ultra-High option. If we're dealing with

Tessellation or Ambient Occlusion, it may be optimal to leave these settings either turned off or put on a low setting so as to not sacrifice game performance. Both of these settings will make your game look better if enabled or on a high setting, but the performance hit will be noticeable unless you're using one of the top-notch high-end graphics cards. The recommended course of action to take here is to start with both of these settings turned off and then one at a time, turn them on but at a low setting, then run a benchmark and compare your result to the baseline result that you get with the default settings.

## OTHER SETTINGS

There are other settings that you can turn on, which will have little to no effect on the performance and will slightly help your game look better. Again, it's best to turn them on and set them to a low setting, then crank them up and run the benchmark again to see what result you get with an ultra-high settings. Some of these include Anisotropic Filtering, Depth of Field, Shadow Quality and Mesh Quality among others.

## BENCHMARK

Although not all games give you the option of running a benchmark, more and more games are including that option as of late. If your game gives you the option to run a benchmark, then I recommend running the benchmark with the default settings you're given and then running it again after you've tweaked some of the settings previously mentioned. The result you'll be given at the end of the benchmark is the frames-per-second, so you want to make note of what result you get with default settings and compare that result to your post-tweak benchmark result. If there wasn't much of a negative difference, then your optimization was successful and you may still have room for improvement. If you noticed a significant decrease in the FPS score from the benchmark, then your optimization failed and you may want to revert back to default settings and tweak your options a bit more conservatively. I prefer to change all options aforementioned at once and run the benchmark again. If unsuccessful, then I try to change these one at a time while

running a benchmark in between to find out what I can get away with and what I can't.



**Oscar** graduated with a music degree from CSUN, is a Music Director/Teacher, software/hardware beta tester, Wikipedia editor, and active member of the Ubuntu community. You can email him at: [7bluehand@gmail.com](mailto:7bluehand@gmail.com)



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## CHA CHA CHA CHANGES

Our admin went AWOL for months, and I had no idea if/when the site would/wouldn't get paid. Initially the plan was to move the site and domain name to my hosting, but eventually I managed to track him down and get the FCM domain name, and site hosting transferred to me.

The new site is now up. **HUGE** thanks to **Lucas Westermann** (Mr. Command & Conquer) for taking on the job of completely rebuilding the site, and scripts, from scratch, in his own time.

The Patreon page that I've set up is to help me pay the domain and hosting fees. The yearly target was quickly reached thanks to those listed on this page. FCM is not going away. Don't worry about that.

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

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

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## FCM#113

**Deadline:**  
Sunday 11th Sept 2016.  
**Release:**  
Friday 30th Sept 2016.



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Our thanks go to Canonical, the many translation teams around the world and **Thorsten Wilms** for the FCM logo.

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