



Full Circle

THE INDEPENDENT MAGAZINE FOR THE UBUNTU LINUX COMMUNITY

ISSUE #115 - November 2016

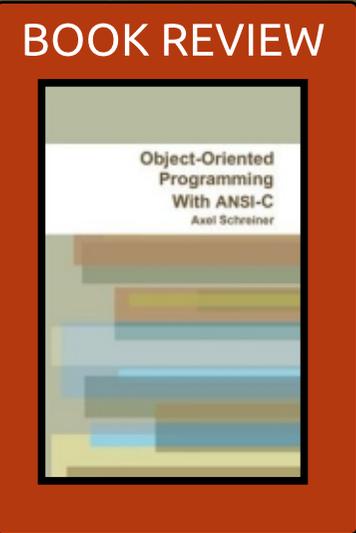


Photo: Charles McColm



COMPUTER RECYCLING BEHIND THE SCENES AT THE WORKING CENTRE

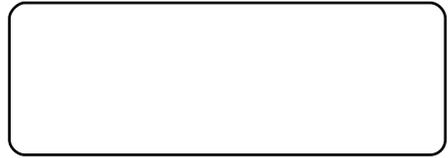
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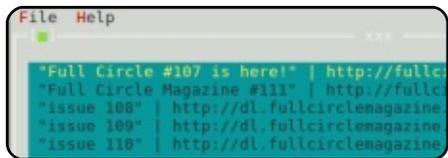
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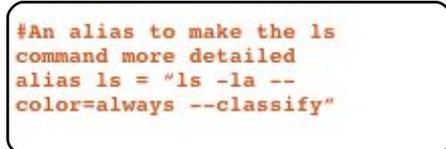


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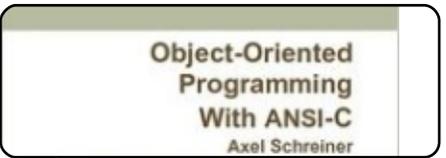
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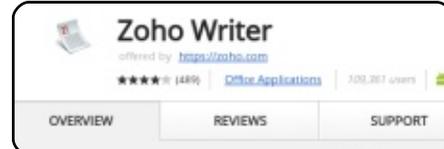
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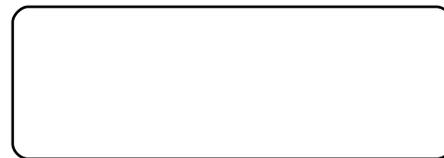
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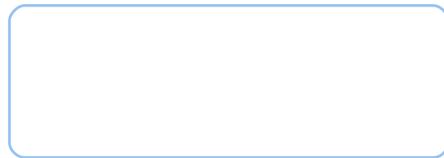
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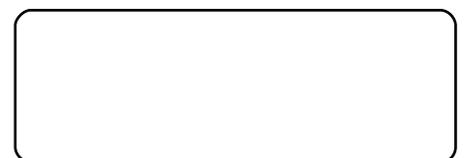
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WELCOME TO ANOTHER ISSUE OF FULL CIRCLE.

Again, the usual suspects are here with FreePascal, Inkscape and Python. The third HowTo is on using 'command-line SMTP' (aka: sending email using the command line). Now that's quirky!

Our cover story this month is by Charles (in his Linux Labs column) and is about the not-for-profit project he works with. It refurbishes old computers (with, of course, Linux) and gives them to needy causes. It's an excellent look behind the scenes at the hardware that's donated to the project. Check Charles' column in FCM#111 to see the process they go through in getting the hardware up to snuff for donating. It's a lot more work than you probably imagine it to be!

Gord has an excellent discussion on backups in his Q&A Tips section. Trust me, you don't realise how valuable a backup is until you really need it, and don't have it. There's no excuse in this day and age. Storage is so much cheaper now than it used to be, and there are a multitude of cloud backup services. Both free and paid for. Pick something, automate your backup, check it often, and you won't regret it. Hopefully you never need it!

Unfortunately, I've not heard back from the Wire devs, so I've no interview for you this month I'm afraid. Hopefully next month.

And even though December is often looked upon as being the holiday season (depending upon where you are) there'll still be an FCM at the end of December.

All the best, and keep in touch!

Ronnie

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<http://fullcirclemagazine.org/feed/podcast>



AMD ROLLS OUT AMDGPU-PRO 16.40 DRIVER FOR UBUNTU AND RED HAT ENTERPRISE LINUX

Designed for newer AMD Radeon GPUs, the AMDGPU-PRO 16.40 driver comes two and a half months after the release of the AMDGPU-PRO 16.30 update, and it adds support for 64-bit Red Hat Enterprise Linux 6.8 and Red Hat Enterprise Linux 7.2 operating systems, as well as Ubuntu 16.04 LTS and 14.04.4 LTS systems.

The AMDGPU-PRO 16.40 driver comes with support for the AMD Radeon R9 M485X, AMD Radeon R7 M465, AMD Radeon R7 M460, AMD Radeon R7 M445, and AMD Radeon R7 M440 GPUs, as well as FirePro features like EDID management and 30-bit color support.

AMDGPU-PRO 16.40 also includes the same features that were available for GNU/Linux users in previous releases, such as basic display and power management

support, KMS (Kernel Mode Setting) and ADF (Atomic Display Framework) support, Vulkan API 1.0, OpenGL 4.5, GLX 1.4, OpenCL 1.2, VDPAU APIs, and a GPL-compliant kernel module.

Source:

<http://news.softpedia.com/news/amd-rolls-out-amdgpu-pro-16-40-driver-for-ubuntu-and-red-hat-enterprise-linux-509737.shtml>

DOCKER 1.12.3 APP CONTAINER ENGINE UPDATES BUILDTAGS FOR UBUNTU 14.04 LTS ARMHF

According to the release notes, Docker 1.12.3 updates the new Swarm Mode feature introduced in the Docker 1.12 series by improving the conversion of restart-policy and adding an up-to-date Swarmkit that now allows multiple randomly assigned and duplicate published ports with different protocols.

Moreover, it looks like a task that has already been restarted will no longer be restarted thanks to the updated Swarmkit included in Docker 1.12.3, which also addresses the panic that occurred when allocations happened at init time. Several fixes were applied to the libnetwork component in Docker 1.12.3 for better networking.

These include a race in load balancer's state, a race discovered during deletion, a deadlock in the networking code, and a race that existed in the serializing sandbox. Additionally, the updated libnetwork library now automatically resets the endpoint port information when the connectivity is revoked in the bridge driver.

Source:

<http://news.softpedia.com/news/docker-1-12-3-app-container-engine-updates-buildtags-for-ubuntu-14-04-lts-armhf-509735.shtml>

HP LINUX IMAGING & PRINTING 3.16.10 ADDS SUPPORT FOR UBUNTU 16.10 AND DEBIAN 8.6

HP Linux Imaging & Printing (HPLIP) 3.16.10 comes a little over a month after the release of the previous version, 3.16.9, to introduce support for Canonical's recently released Ubuntu 16.10 (Yakkety Yak) operating system, as well as for the sixth update to the stable Debian GNU/Linux 8 "Jessie" series.

Apart from that, HPLIP 3.16.10 adds support for new HP printers and scanners, including HP OfficeJet 6950 All-in-One printer, HP OfficeJet Pro 7740 Wide Format All-in-One printer, HP ScanJet Pro 3000 s3 Sheet-feed scanner, HP ScanJet Enterprise Flow 5000 s4 Sheet-feed scanner, and HP Color LaserJet Pro MFP M277c6 printer.

Source:

<http://news.softpedia.com/news/hp-linux-imaging-printing-3-16-10-adds-support-for-ubuntu-16-10-and-debian-8-6-509770.shtml>

LINUX KERNEL 4.8.5 LANDS WITH NUMEROUS CIFS, ARM64, AND POWERPC IMPROVEMENTS

Linux kernel 4.8.5 is here less than a week after the announcement of the fourth maintenance update to the Linux 4.8 kernel series, which is currently the most stable and advanced you can get for a GNU/Linux distribution, and according to the appended shortlog and the diff from the previous release, it's a pretty big one, changing a total of 152 files, with 1416 insertions and 612 deletions.

Taking a quick look at the changes implemented in the Linux 4.8.5 kernel update, we can notice that there are multiple improvements to the ARM64 (AArch64), PowerPC (PPC), and x86 hardware architectures, along with minor changes to MIPS, PA-RISC, ARC, s390, and METAg. There are also numerous enhancements to the CIFS file system, as well as to NFS, Ceph, ISOFS, JBD2, OverlayFS, and CryptoFS.

Source:

<http://news.softpedia.com/news/linux-kernel-4-8-5-lands-with-numerous-cifs-arm64-and-powerpc-improvements-509769.shtml>

LINUX KERNEL 4.4.28 LTS RELEASED WITH MANY IMPROVEMENTS TO THE CIFS FILE SYSTEM

Linux kernel 4.4.28 LTS is here, coming one week after the release of the previous maintenance version, and promising to change a total of 119 files, with 1310 insertions and 667 deletions, at least according to the appended shortlog and the diff from Linux kernel 4.4.27 LTS. The Linux 4.4 kernel branch is LTS (Long Term Support) and currently used in some of the most stable and reliable operating systems.

Looking at the changes, we can notice that the Linux 4.4.28 LTS kernel release adds various improvements to the PowerPC (PPC), x86, ARM64 (AArch64), ARC, MIPS, METAg, PA-RISC, and s390 hardware architectures, better support for Common Internet File

System (CIFS), along with small fixes to the Ceph, JBD2, EXT4, NFS, OverlayFS, and ISOFS filesystems. But there are also some core kernel, mm, sound, and perf enhancements.

Source:

<http://news.softpedia.com/news/linux-kernel-4-4-28-lts-released-with-many-improvements-to-the-cifs-file-system-509773.shtml>

BODHI LINUX 4.0.0 OFFICIALLY RELEASED BASED ON UBUNTU 16.04.1 LTS, MOKSHA 0.2.1

Built on top of the recently released, Enlightenment-based Moksha 0.2.1 desktop environment, and based on the Ubuntu 16.04.1 LTS (Xenial Xerus) operating system, Bodhi Linux 4.0.0 arrives in its final, production-ready state powered by the long-term supported Linux 4.4 kernel fully patched against the "Dirty COW" vulnerability.

Bodhi Linux 4.0.0 has been in development for the past four months, during which it received two Alpha snapshots and no less

than three Beta builds, which brought numerous improvements, bug fixes, and lots of goodies to the GNU/Linux distribution that features its own Enlightenment-based desktop environment, the gorgeous Moksha.

Source:

<http://news.softpedia.com/news/bodhi-linux-4-0-0-officially-released-based-on-ubuntu-16-04-1-lts-moksha-0-2-1-509792.shtml>

SOME DISAPPOINTED APPLE FANS ARE MOVING TO UBUNTU LINUX

Thanks to technology enthusiasts' underwhelming response to Apple's October event, a big flock of users turned to the famed Ubuntu laptop seller System76 whose website witnessed about 4-times more traffic than usual. As a result, System76 needed to upgrade the servers to keep up. It could be seen as a sign that users are looking at Linux machines as Mac-alternatives.

At its October event, Apple tried hard to convince the users that its latest MacBook Pro is built

for professional users. The company showed off the brand new Touch Bar that changed its appearance depending on the applications running on the screen. The new MacBooks are thinner and more powerful than ever. But, there's something missing that's driving away some diehard Apple fans.

Firstly, Apple decided to ditch a large array of connectivity ports—HDMI ports, SD card slot, Thunderbolt 2 ports, and standard USB port. These ports have been replaced by 4 Thunderbolt 3/USB-C ports. So, the same power user segment that's being aimed by Apple, is expressing lots of concerns.

Source:

<https://fossbytes.com/system76-laptop-apple-replacement/>

CAINE 8.0 PROVIDES A COMPLETE DIGITAL FORENSIC ENVIRONMENT

Ubuntu-based CAINE (Computer Aided INvestigative Environment) GNU/Linux distribution is designed by Italian developer Nanni Bassetti

to be a complete digital forensic environment, and it was updated on October 31, 2016, to version 8.0.

Dubbed "Blazar," powered by the long-term supported Linux 4.4 kernel and Ubuntu 16.04 (Xenial Xerus) operating system CAINE 8.0 arrives after one year of hard work with UEFI (Unified Extensible Firmware Interface) and Secure Boot support, renewed and new tools, including the Systemback open-source and simple system backup and restore application.

Among the included tools, we can mention XAll 1.5, MemDump, XRCed, PEFrame, Tilda, Shrew, RecuperaBit, Gigolo, Jeex, Samba, SQLParse, Yara, wxHexEditor, ADB and LibMobileDevice, PffLib, HashDB, imount, vhdmount, vhdinfo, iscsitarget, img_map, and vblade.

Source:

<http://news.softpedia.com/news/caine-8-0-blazar-gnu-linux-os-provides-a-complete-digital-forensic-environment-509852.shtml>

LINUX LITE 3.2 RELEASED

WITH A FOCUS ON SECURITY, BASED ON UBUNTU 16.04.1 LTS

Based on Ubuntu 16.04.1 LTS (Xenial Xerus) operating system and shipping with the long-term supported Linux 4.4 kernel, Linux Lite 3.2 arrives today with a focus on security, as the developer implemented support for fetching the latest Linux kernel security updates as soon as they become available in the repositories. These will be distributed to users via the Install Updates tool.

Also new and exciting in the Linux Lite 3.2 release is an optional feature called Lite Desktop Widget, which promises to offer users basic system information about the installed distribution right on their desktops. GRUB bootloader support for booting Linux Lite alongside other GNU/Linux distributions has been implemented.

Source:

<http://news.softpedia.com/news/linux-lite-3-2-released-with-a-focus-on-security-based-on-ubuntu-16-04-1-lts-509844.shtml>

OPEN SOURCE LEADER NITHYA RUFF JOINS THE LINUX FOUNDATION BOARD OF DIRECTORS

Nithya Ruff, director of Western Digital's Open Source Strategy Office, has joined the Board of Directors of the Linux Foundation. In addition to Ruff, the Linux Foundation has also appointed Erica Brescia, co-founder and COO of Bitnami and Jeff Garzik, co-founder of Bloq, to its Board of Directors.

Ruff runs the open source program office for WD and also leads the gender diversity efforts through the WD Women's Innovation Network Board, which is an Employee-led group that advocates for women to achieve their highest potential in the company.

She is co-leader of the Women of OpenStack group and a liaison into the OpenStack Foundation, as well as a sponsor of the Women in Open Source (WIOS) Luncheons at Linux Foundation events and she is an active leader of WIOS advocating for reducing barriers

for women and underrepresented minorities.

Source:
<http://www.cio.com/article/3137948/linux/open-source-leader-nithya-ruff-joins-the-linux-foundation-board-of-directors.html>

4MLINUX 20.0 GNU/LINUX DISTRIBUTION HITS STABLE CHANNEL, ADDS NEW BOOT OPTIONS

4MLinux 20.0 has entered development at the beginning of September, when the Core edition was pushed to the Beta channels for early adopters, as well as for the 4MLinux developer to rebase all of his GNU/Linux distributions on the new system, which is now powered by the long-term supported Linux 4.4.27 kernel fully patched against the "Dirty COW" vulnerability.

Probably the most important change in the 4MLinux 20.0 release is the implementation of new boot options that let users boot the GNU/Linux distro on both UEFI and Legacy BIOS PCs. 4MLinux 20.0 ships today with lots of up-to-date

software components, including the latest LibreOffice 5.2.3.2 office suite, GIMP 2.8.18 image editor, iTunes 3.1.2 audio player, Mozilla Firefox 49.0.2 web browser, Dropbox 12.4.22 file sharing client, VLC Media Player 2.2.4, and MPlayer SVN-r37881 video player.

Software apps like Chromium 53.0.2785.143, Skype 4.3.0.37, Mozilla Thunderbird 45.4.0, Audacious 3.8, Mesa 12.0.1 3D Graphics Library, and Wine 1.9.20 are also pre-installed in 4MLinux 20.0, which ships with a powerful LAMP (Linux, Apache, MariaDB and PHP) server running Apache 2.4.23, MariaDB 10.1.18, PHP 5.6.27, Perl 5.24.0, and Python 2.7.12.

Source:
<http://news.softpedia.com/news/4mlinux-20-0-gnu-linux-distribution-hits-stable-channel-adds-new-boot-options-509882.shtml>

CLOUDLINUX'S KERNELCARE LIVE PATCHING SOLUTION SUPPORTS UBUNTU, DEBIAN & CENTOS

With customers like Dell and LiquidWeb, which run

KernelCare on thousands of their servers, CloudLinux managed to offer users an unmatched kernel live patching solution that offers a no roll-back functionality that offers great flexibility to system administrators, allowing them to test their servers with or without it, as well as to install and uninstall without a reboot.

At the moment, KernelCare works on CentOS 5.x, 6.x, and 7.x, as well as CentOS 7 Plus, Red Hat Enterprise Linux 5.x, 6.x, and 7.x series, CloudLinux OS 5.x, 6.x, and 7.x, Debian GNU/Linux 6.x, 7.x, and 8.x, Xen4CentOS 6 and 7, Proxmox 2.6, 3.10, and 4.4, as well as Ubuntu 14.04 LTS and 16.04 LTS. It also supports Virtuozzo/OpenVZ 2.6.32, Xen, KVM, PSBM, VirtualBox, VMware, Microsoft Hyper-V, VZ, PCS, and LXC virtualizations.

As for the supported kernels, it appears that KernelCare provides support for Linux kernels from the 2.6.18, 2.6.32, 3.10.0, 3.13, 3.16, 3.18, 3.19, 4.2, and 4.4 branches. 32-bit and 64-bit supported is provided as well, along with binary patches for known vulnerabilities and support for custom patches. Pricing starts at ~\$3 USD per server/month or \$25 USD per year.

Source:

<http://news.softpedia.com/news/cloudlinux-s-kernelcare-live-patching-solution-supports-ubuntu-debian-centos-509946.shtml>

UBUNTU CORE 16 LAYS FOUNDATION FOR A MORE SECURE IOT

Canonical has released the Ubuntu Core 16 for the IoT, with regular and reliable security updates, and app stores for intelligent connected devices.

The Ubuntu Core is already in use in top-of-rack switches, industrial gateways, home gateways, radio access networks, digital signage, robots and drones. "The Ubuntu Core secures the Internet of Things and provides an app store for every device," said Mark Shuttleworth, founder of Ubuntu and Canonical.

The Core delivers a combination of security, management, operations and upgradability in a compact, developer-friendly platform, thanks to its use of read

only 'snap' packages. These packages are securely confined, tamper-proof application images, digitally signed to the integrity of IoT software.

According to Canonical, Update Control will allow software publishers and manufacturers to validate updates across the ecosystem before they are applied. Snap updates are transactional, which means that failures are automatically rolled back, giving developers the confidence to update their applications regularly.

The operating system and kernel in Ubuntu Core are also delivered as snaps, so the entire platform is transactionally upgradeable while all Ubuntu Core devices, from all manufacturers, will have free, regular and reliable OS security updates.

Source:

<http://www.newelectronics.co.uk/electronics-news/ubuntu-core-16-lays-foundation-for-securer-iot/147674/>

CLAWS MAIL 3.14.1 ADDS NOTIFICATION SUPPORT FOR UBUNTU'S UNITY MESSAGING MENU

The free, GTK+ based, open-source, fast, user-friendly and lightweight Claws Mail email client has been updated today, November 6, 2017, to version 3.14.1 for GNU/Linux distributions.

Claws Mail 3.14.1 brings lots of changes, including two new hidden preferences, namely 'hide_timezone' and 'rewrite_first_from.' While the first one is used for setting the timezone of date fields that are sent over the network to an unknown timezone value specified in RFC 5322 §3.3, the second one is designed as a workaround for a limitation of various mail servers with 'overly-liberal parsers.'

Claws Mail 3.14.1 now enforces the "strong enough" Diffie-Hellman prime for systems that use older versions of the GnuTLS library. The RSSyl, vCalendar, PDF Viewer, and Notification plugins have been updated as well with various new features, such as

support for Ubuntu's Unity messaging menu to receive Claws Mail notifications, and it looks like a total of 25 bugs reported by users since version 3.14.0 were addressed.

Source:

<http://news.softpedia.com/news/claws-mail-3-14-1-adds-notification-support-for-ubuntu-s-unity-messaging-menu-510006.shtml>

LINUX FOUNDATION PROVIDES INSIGHTS INTO THE OPEN CLOUD

Cloud computing is becoming more important in today's digital world. A recent report revealed that more than 40% of enterprise workloads are running in the cloud, and the number is only expected to increase. The Linux Foundation wants to make sure businesses stay on top of the latest open-source cloud technologies and trends with the release of its 2016 Guide to the Open Cloud report.

One of the most surprising takeaways of the report included the amount of user-generated, open-source software. Typically

projects are developed by solution providers, but more and more companies are providing user-generated open-source software.

Source:

<http://sdtimes.com/linux-foundation-provides-insights-open-cloud/>

LINUX KERNEL 4.8.7 UPDATES INTEL AND RADEON DRIVERS, IMPROVES WIRELESS SUPPORT

Linux kernel maintainer Greg Kroah-Hartman announced the release of the seventh maintenance update to the Linux 4.8 kernel series, along with the Linux kernel 4.4.31 LTS long-term support version.

Finally, the release cycle of Linux kernel 4.8 has settled in and it looks like more and more GNU/Linux distributions are adopting it, including the upcoming openSUSE Leap 42.2 and Fedora 25, due for release next week. Rolling release users of Solus, Arch Linux, and openSUSE Tumbleweed are already enjoying

the latest Linux kernel 4.8 updates, and soon they'll receive a new one, Linux kernel 4.8.7, which comes ten days after Linux kernel 4.8.6.

Source:

<http://news.softpedia.com/news/linux-kernel-4-8-7-updates-intel-and-radeon-drivers-improves-wireless-support-510122.shtml>

ALPINE LINUX 3.4.6 UPDATES PHP, BUSYBOX, AND CURL, USES LINUX KERNEL 4.4.30 LTS

A new stable release of the open-source, server-oriented Alpine Linux operating system has been announced on the 8th of November 2016, bringing a brand new kernel and many up-to-date components.

Alpine Linux 3.4.6 is the sixth maintenance update in the stable 3.4 series of the GNU/Linux distribution used in numerous small or big server environments worldwide, and it comes only two weeks after the 3.4.5 release to bump the kernel version to the latest upstream release, namely Linux kernel 4.4.30 LTS, which was

a minor update patching a bug in Linux kernel 4.4.29 LTS and older builds.

Source:

<http://news.softpedia.com/news/alpine-linux-3-4-6-updates-php-busybox-and-curl-uses-linux-kernel-4-4-30-lts-510095.shtml>

BLACK LAB LINUX 8.0 "ONYX" OFFICIALLY RELEASED, IT'S BASED ON UBUNTU 16.04 LTS

After being in development since the very first days of 2016, during which it received four Alpha builds, three Beta releases, and a Release Candidate (RC) version, Black Lab Linux 8.0 "Onyx" is finally available, but only as a commercial product. A free download will be provided to the community on December 15, 2016. The operating system is based on Ubuntu 16.04 LTS Xenial (Xerus).

Black Lab Linux 8.0 "Onyx" ships with a large number of new features, including a total of six desktop environments, such as KDE Plasma 5, LXDE, GNOME 3.18, Xfce, GNOME Flashback, and Unity.

It's powered by the same kernel as Ubuntu 16.04 LTS, version 4.4.0-45, and offers full UEFI and exFAT support, systemd and Upstart support, and Google Drive integration.

Source:

<http://news.softpedia.com/news/black-lab-linux-8-0-onyx-officially-released-it-s-based-on-ubuntu-16-04-lts-510127.shtml>

FEDORA 25 LINUX DELAYED BY A WEEK, COULD ARRIVE ON NOVEMBER 22, 2016

Platform and Fedora Program Manager Jan Kurik dropped the bad news earlier on the project's mailing list, and it now looks like the next planned GA (General Availability) date for the Fedora 25 Linux operating system is November 22, 2016. The release was delayed due to a bug in the boot menu, which was not visible on a Mac OS X dual boot install.

Last week, we reported that the Fedora 25 operating system was in Final Freeze, the most important step in its development cycle, which means that no new package versions will be added to the

repositories until the final release hits the streets. Only critical bugs were allowed during the Final Freeze stage.

Source:

<http://news.softpedia.com/news/fedora-25-linux-delayed-by-a-week-could-arrive-on-november-22-2016-510125.shtml>

OPENSUSE TUMBLEWEED USERS GET LATEST LINUX KERNEL, MESA, AND KDE PLASMA UPDATES

OpenSUSE Project's Douglas DeMaio reports on the latest updates brought by a total of four snapshots for the openSUSE Tumbleweed rolling release Linux-based operating system.

During the first week of November, openSUSE Tumbleweed users have been treated with a lot of goodies, including the latest KDE Plasma 5.8.3 LTS desktop environment, Samba 4.5.0 free software re-implementation of the SMB/CIFS networking protocol, YAST2 (Yet another Setup Tool) 3.2.3, the Epiphany 3.22.2 web browser, and Linux kernel 4.8.6.

Source:

<http://news.softpedia.com/news/open-suse-tumbleweed-users-get-latest-linux-kernel-mesa-and-kde-plasma-updates-510129.shtml>

DOCKER 1.13.0 ENTERS DEVELOPMENT, TO ADD SUPPORT FOR UBUNTU 16.10 AND FEDORA 25

Docker 1.13.0 promises to be a major release, and the changelog of the first RC build is already huge, suggesting numerous build improvements, such as the ability to specify images that can be used as a cache source during build, the implementation of an experimental option for squashing image layers to the FROM image after a successful build, as well as step number support and "--network" option to the "docker build" command.

There's also support for compressing the build context when building an image, and unused build-args are now permitted. Moreover, it looks like Docker 1.13.0 will add DEB and RPM builder for the Ubuntu 16.10

(Yakkety Yak) and Fedora 25 operating systems respectively, along with support for building Docker Debian packages (DEBs) for the Ubuntu 16.04 LTS (Xenial Xerus) distro on IBM System z (s390x) and PowerPC (PPC) 64-bit architectures.

Source:

<http://news.softpedia.com/news/docker-1-13-0-enters-development-to-add-support-for-ubuntu-16-10-and-fedora-25-510177.shtml>

CREATE YOUR OWN UBUNTU 16.10 LIVE ISO WITH THE NEW LINUX FOR ALL (LFA) DISTRO

Arne Exton, the developer of many GNU/Linux distributions and Android-x86 flavors, announced the release of a new version of his Linux For All (LFA) Live DVD.

Based on the latest Ubuntu 16.10 (Yakkety Yak) operating system, LFA Live DVD Build 161114 is a total rebuild, powered by the newest Linux 4.8 kernel and including various elements from the Debian Testing (Stretch)

repositories, including the Refracta Tools, which let users create their own Ubuntu-based Live systems.

Also new in the LFA Live DVD Build 161114 release, there's the Nvidia 370.28 proprietary video driver for owners of Nvidia GPUs, and the latest software versions from the upstream Ubuntu and Debian Stretch repos as of November 14, 2016. Best of all, you can download LFA's Linux 4.8 kernel if you want to use it in another Ubuntu- or Debian-based distro.

Source:

<http://news.softpedia.com/news/create-your-own-ubuntu-16-10-live-iso-with-the-new-linux-for-all-lfa-distro-510210.shtml>

STEAMVR IS COMING TO LINUX AND MACOS, BETA EXPECTED "IN THE NEXT FEW MONTHS"

Steam is bringing its virtual reality platform to Linux and macOS, and it looks like the first preview should be available to those users early next year.

Valve's Joe Ludwig revealed at a developer event that the company is "actively working on support for both OS X and Linux and we hope to get support for both of them into a beta in the next few months".

Ludwig added that Valve has been keenly listening to feedback from both users and developers, who have said that they're eager for the company to expand SteamVR availability to other operating systems. However, Valve hasn't yet announced a firm date for when the first beta will be available for SteamVR on Linux and macOS.

Ludwig also emphasized that Valve is firmly committed to ensuring that VR is open to innovation, and wider availability of SteamVR is an important step in sticking to that commitment.

Source:

<https://www.neowin.net/news/steamvr-is-coming-to-linux-and-macos-beta-expected-in-the-next-few-months>

MICROSOFT: SQL SERVER FOR LINUX IS THE REAL DEAL

Those who wondered what it would be like to run Microsoft SQL Server on Linux now have an answer. Microsoft has released the first public preview of the long-promised product.

Microsoft also wants to make clear this isn't a "SQL Server Lite" for those satisfied with a reduced feature set. Microsoft has a four-point plan to make this happen.

By bringing SQL Server to Linux, Microsoft can compete more directly with Oracle, which has long provided its product on Linux. Oracle may be blunting the effects of the strategy by shifting customers toward a cloud-based service model, but any gains are likely to be hard-won.

The other, immediate benefit is to provide Microsoft customers with more places to run SQL Server. Enterprises have historically run mixes of Linux and Windows systems, and SQL Server on Linux will let them shave the costs of running some infrastructure.

Source:

<http://www.infoworld.com/article/3142360/sql/microsoft-sql-server-for-linux-is-the-real-deal.html>

SYSTEM76 ADDS 4K DISPLAY TO UBUNTU LINUX-POWERED MACBOOK PRO COMPETITOR ORYX PRO

Apple makes a damn good laptop, and its new MacBook Pro computers are no exception. Unfortunately for some, Apple's latest offerings are too expensive and fall short -- most models lack the ability to upgrade the SSD, and the RAM maxes out at 16GB. Interestingly, many upset Apple fans even turned to System76 and its Ubuntu-powered machines following the big MacBook Pro unveil.

At the time, I compared the MacBook Pro to the Oryx Pro to highlight that you could get more performance from System76 for less money. Obviously, it was not an entirely fair comparison, as they are different in many ways. For example, the Oryx Pro only featured a 1080p screen. Today, this changes, however, as

System76 adds a 4K display option to its MacBook Pro competitor. Will this make macOS users more likely to switch to Linux?

The Oryx Pro is one of System76's most well-balanced machines. In fact, Ryan Sipes, Community Manager at System76 tells me, "the Oryx is our metal body professional grade laptop. It's slim enough to travel with you, but powerful enough to accomplish any task".

Source:

<http://betanews.com/2016/11/17/system76-4k-display-ubuntu-linux-oryx-pro/>

UBUNTU 17.04 TO OFFER AN EVOLVED UNITY 8 SESSION AS MORE APPS WILL RUN AS SNAPS

Canonical held its Ubuntu Online Summit (UOS) event between November 15 and November 16, 2016, during which members of the Ubuntu community were able to learn more about what's coming to the Ubuntu 17.04 Linux.

In a session entitled Convergence Q&A Canonical's Will Cooke, Richard Collins and Michał Sawicz discuss the road to a fully converged Ubuntu desktop that will run on any hardware and screen size. As you might know, Ubuntu 16.10 (Yakkety Yak) shipped with a technical preview of the Unity 8 user interface (UI), which some of us were able to test.

Why some of us? Because currently Unity 8 is not compatible with proprietary graphics drivers for Nvidia and AMD Radeon GPUs, doesn't run well on any virtualization software, and if you're lucky to have a computer that runs Unity 8, you'll have a barely functional Unity interface where only a few apps are working, and the 3D performance is not all that great.

As Canonical's convergence vision continues for Ubuntu 17.04 (Zesty Zapus), due for release in April 2017, the company will provide users with a more evolved Unity 8 session where more applications run as Snaps. Additionally, it also looks like the Snappy Store will be fully set up to run Snaps, as Snappy is becoming

the default in a future version of the Debian-based operating system.

Source:

<http://news.softpedia.com/news/ubuntu-17-04-to-offer-an-evolved-unity-8-session-as-more-apps-will-run-as-snaps-510281.shtml>

VIRTUALBOX 5.1.10 BRINGS INITIAL LINUX KERNEL 4.9 SUPPORT, MANY GUI IMPROVEMENTS

VirtualBox 5.1.10 is here exactly two months after the previous point release, namely VirtualBox 5.1.8, and we have some good news for Linux users, as Oracle added initial support for the upcoming Linux 4.9 kernel, which will be released in the second week of December 2016. It also fixes the Linux kernel module override rule in Linux Additions.

Now, it looks like VirtualBox 5.1.10 adds a bunch of GUI improvements that should enhance the usability of the software. For example, Oracle's developers tried to address various issues in the Unscaled HiDPI Output mode,

implement Print Screen-related actions to the VM Input menu, and patch a crash/hang bug with accessibility support enabled.

Among other noteworthy improvements that landed in VirtualBox 5.1.10, we can mention better handling of inserting the Guest Additions ISO image by also attempting to use the rest of the available virtual optical drives, and it's now possible to specify the USB revision in hexadecimal format in the USB filter settings dialog.

Source:

<http://news.softpedia.com/news/virtualbox-5-1-10-brings-initial-linux-kernel-4-9-support-many-gui-improvements-510424.shtml>

SUSE RELEASES THE FIRST OFFICIAL 64-BIT LINUX OS FOR RASPBERRY PI 3

SUSE has released the first official 64-bit Linux-based operating system for Raspberry Pi 3. This release is basically a version of Linux Enterprise Server 12 SP2 that supports Raspberry Pi 3. The users need to visit SUSE's website, make an account, and download

the OS image.

Raspberry Pi Foundation released the first 64-bit version of its popular hackerboard, with more than 10 million devices sold, in the form of Raspberry Pi 3 Model B. However, the users missed an official 64-bit operating system that came with Raspberry Pi support.

SUSE has taken up this initiative and developed a version of its 64-bit SUSE Linux Enterprise Server for Raspberry Pi 3. Now, developers and makers can benefit from the solid source code of SUSE Linux Enterprise Server 12 SP2.

Source:

<https://fossbytes.com/suse-enterprise-linux-server-raspberry-pi/>

SQL SERVER ON LINUX: RUNS WELL IN SPITE OF INTERNAL QUIRKS. WHY?

Microsoft has released a public preview of SQL Server for Linux, and I took it for a spin.

There are three supported platforms for SQL Server on Linux,

these being Red Hat Enterprise 7.2, Ubuntu 16.04, and a Linux-based Docker engine. Installation on other versions of Linux may also work, although unsupported. The Docker image enables installation on Mac or Windows. Microsoft specifies a minimum of 3.25GB of RAM.

I installed on a modest 8GB dual-processor VM running Ubuntu 16.04 "Xenial" for testing. Setup involves agreeing a licence and setting an SA (system administrator) password. I then installed command-line tools, sqlcmd (execute SQL queries) and bcp (bulk copy). The install script prompts you to enable automatic start-up.

What is SQL Server on Linux? It appears to be essentially the same code as Windows SQL Server running on a compatibility layer, called the SQL Platform Abstraction Layer (SQLPAL), which maps Windows API calls to OS system calls. Also in the mix is a piece called SQL OS, described as a "user mode operating system", which abstracts the hardware and provides services such as task scheduling, memory management and exception handling. SQL OS

has been in SQL Server since 2005; it was not developed for Linux, but has now been extended.

This means that even on Windows, SQL Server has long used some virtualisation techniques.

Source:

http://www.theregister.co.uk/2016/11/24/sql_server_on_linux_international_odds_but_runs_well/

FEDORA 25 LINUX ARRIVES WITH WAYLAND DISPLAY SUPPORT

Fedora used to be the leading, bleeding edge Linux distribution. Then its release cadence slowed down. With its second release of 2016, Fedora 25, Fedora is back to exploring the newest Linux releases and programs.

The big news for desktop users in Workstation is the Wayland display server has finally replaced the legacy X11 Window server. Wayland has been in the works since 2008. The point of Wayland is to provide a smoother, richer experience for graphical

environments. X also had a huge amount of functionality that was no longer being used.

On top of Wayland, Fedora 25 Workstation runs GNOME 3.22. This latest desktop claims to offer multiple file renaming, a redesigned keyboard settings tool, and additional user interface improvements. If, like me, you're not a GNOME fan, Fedora 25 also supports spins with other default desktops. These include KDE, XFCE, LXDE, MATE, and Cinnamon.

Source:

<http://www.zdnet.com/article/fedora-25-linux-arrives-with-wayland-display-support/>

INTEL GRAPHICS INSTALLER FOR LINUX 2.0.3 SUPPORTS UBUNTU 16.10 AND FEDORA 24

Previously known as Intel Graphics Installer for Linux, the Intel Graphics Update Tool is designed to let users install the latest graphics drivers for their Intel HD GPUs. It's specifically made for Ubuntu and Fedora distributions, and the latest

version finally adds support for Ubuntu 16.10 (Yakkety Yak) and Fedora 24, though Fedora 25 is out.

Included in Intel Graphics Update Tool 2.0.3 is the Mesa 12.0.3 3D Graphics Library, Cairo 1.15.2 graphics library, libva-intel-driver 1.7.2, as well as all the libva related libraries, such as libva-wayland, libva-tpi, libva-glx, libva-egl, libva-drm, libva-x11, and libva-utls. The new version also supports Intel Graphics Stack Recipe 2016Q3 for Linux.

To install Intel Graphics Update Tool 2.0.3 right now on your Ubuntu 16.10 or Fedora 24 OS, you'll need to download either the 64-bit or 32-bit binary package for your GNU/Linux distribution from the announcement page above, save the file on your Home directory, open a terminal emulator and execute the "sh ./intel-linux-graphics-update-tool" command (without quotes).

Source:

<http://news.softpedia.com/news/intel-graphics-installer-for-linux-2-0-3-supports-ubuntu-16-10-and-fedora-24-510458.shtml>

Linux Kernel 4.4.33 LTS Introduces Minor MIPS and Btrfs Fixes, Updated Drivers

Just like Linux kernel 4.8.9, Linux kernel 4.4.33 LTS is here only four days after the release of the thirty-second maintenance update to the long-term supported branch, but it looks like it's a small version, changing a total of 37 files, with 268 insertions and 162 deletions, according to the appended shortlog and the diff from Linux kernel 4.4.32 LTS announced on November 15, 2016.

It looks like Linux kernel 4.4.33 LTS includes mostly updated drivers, for ACPI, GPU (Intel i915), iio, IOMMU, DMA, CLK, MMC, Ethernet (Intel i40e), NFC, SCSI, TTY, USB, and PINCTRL devices, but there are also minor changes to the s390, MIPS, and ARC hardware architectures, a fix for the Btrfs file system, and an updated sound stack that adds small fixes to the sun4i-codec and Cirrus Logic CS4270 ASoC.

Therefore, if you're using a Linux-based operating system powered by a kernel from the long-term supported Linux 4.4 series, you are urged to update to version

4.4.33 as soon as possible, or more precisely as soon as it lands in the stable repositories of your favorite distro.

Source:

<http://news.softpedia.com/news/linux-kernel-4-4-33-lts-introduces-minor-mips-and-btrfs-fixes-updated-drivers-510366.shtml>

ESCUELAS LINUX 5.0 "BERSERKER" IS BASED ON BODHI LINUX 4.0.0 AND UBUNTU 16.04

Dubbed Berserker, Escuelas Linux 5.0 is based on the recently released Bodhi Linux 4.0.0 distribution, which, in turn, is based on Canonical's Ubuntu 16.04 LTS (Xenial Xerus) operating system. Being primarily based on Bodhi Linux, Escuelas Linux 5.0 uses the Enlightenment-based Moksha desktop environment as default graphical interface. However, it uses Ubuntu 16.04's long-term supported repositories.

As mentioned before, Escuelas Linux 5.0 is a major release that includes numerous updated components and applications,

among which we can mention the LibreOffice 5.2.3 office suite, Google Chrome 54.0 and Chromium 53.0 web browsers, LiveCode 8.1.2 rapid application development runtime environment, Kdenlive 16.08.2 video editor, Gcompris 0.61 educational software, and Kompozer 0.8 WYSIWYG HTML and CSS editor.

Escuelas Linux 5.0 also offers a revamped look and feel that is more modern and appealing to newcomers. The distro supports both English and Spanish languages, and it suffers from the same AMD Radeon graphics driver support as Ubuntu 16.04 LTS and Bodhi Linux 4.0.0, meaning that only a few AMD Radeon graphics cards are supported at the moment.

Source:

<http://news.softpedia.com/news/escuelas-linux-5-0-berserker-is-based-on-bodhi-linux-4-0-0-and-ubuntu-16-04-510361.shtml>

NEW IOT BOTNET BEHIND FAKE INSTAGRAM, TWITTER AND YOUTUBE PROFILES

Hackers have created thousands of fake accounts on popular social media platforms like Instagram, Twitter, YouTube and Periscope, via an IoT botnet, using the Linux/Moose malware. Security researchers claim that fake social media accounts are created by hackers to randomly follow people and browse content, in efforts to make the bots seem more "human" and avoid spam filters.

According to security researchers, the Linux/Moose botnet is a "new generation" IoT botnet that operates on embedded systems such as routers, rather than computers. This makes the bot much more difficult to detect. The botnet can function on even limited computational power and specialises in "social media fraud".

The researchers claim that the fake accounts created by the Linux/Moose malware use random numbers and letters as their usernames and have generic images such as those of "plants, buildings, landscapes or animals" as their profile pictures. The accounts also do not post anything

and have no followers. However, they generally follow up to 822 people. The researchers also estimated that the "potential revenue" of a Linux/Moose bot was "\$13.05 per month".

Source:

<http://www.ibtimes.co.uk/new-iot-botnet-behind-fake-instagram-twitter-youtube-profiles-1592761>

FEDORA 25 RELEASED WITH WAYLAND, GNOME 3.22, AND KERNEL 4.8

Fedora 25 Linux distribution has been released by the Fedora project. It comes in three editions Workstation, Server, and the newer Atomic Host. The latest release includes GNOME 3.22, Wayland, Linux Kernel 4.8, and MP3 codec support, along with many other changes and bug fixes.

The Fedora Project has just announced the latest release of its Linux distribution Fedora 25. In the new release, Fedora 25 is offered in Workstation, Server, and Atomic Host editions. Fedora 25 Atomic has taken the place of Fedora Cloud edition in this release.

In the latest release, Fedora 25

Server now shows SSH keys in the Cockpit dashboard, allowing admins to monitor keys connected to a particular machine. It also adds supports for multi-step authentication methods like Two-factor. A new SELinux Troubleshooter module is available for Cockpit in the new Server edition.

Also, the identity management system FreeIPA has been updated to 4.4.x series. The newer version adds support for managing topology graph for large deployments using FreeIPA's web interface, creating subordinate Certificate Authorities capable of issuing certificated within specified limits, etc.

Source:

<https://fossbytes.com/fedora-25-released-download-features/>

KDE PLASMA 5.8.4 LTS DESKTOP ENVIRONMENT RELEASED FOR LINUX WITH MORE BUG FIXES

KDE announced the release of the fourth maintenance update to the long-term supported

KDE Plasma 5.8 desktop environment for Linux-based operating systems.

KDE Plasma 5.8.4 LTS is here three weeks after the third point release, versioned 5.8.3, and as expected, it's yet another bugfix release that attempts to improve the stability, security, and reliability of the KDE Plasma 5.8 desktop environment, which will receive support until April 2018. This version will soon land in the stable repositories of your favorite GNU/Linux distribution.

KDE Plasma 5.8.4 LTS desktop environment release addresses various bugs reported by users since KDE Plasma 5.8.3 LTS or previous versions with the Breeze, Plasma Discover, Plasma Addons, KWayland-integration, Oxygen, Plasma Desktop, Plasma SDK, Plasma Workspace, and KWin components. Study the full changelog for more technical details.

Source:

<http://news.softpedia.com/news/kde-plasma-5-8-4-lts-desktop-environment-released-for-linux-with-more-bug-fixes-510399.shtml>



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



The way I get my ideas for these articles is often inspired by things I accomplished that month - be it applying a new approach to a task, or solving a problem that's plaguing me. Unfortunately, I haven't had to do either thing this month. As such, I'll be focusing on a few basic tips I use almost daily.

CONVERT MKV TO MP4

I use Plex Media Server to stream my DVD collection from my NUC. For a long while, I ripped any videos into an MKV format, but, a few years ago, I switched to an mp4 approach, since I started using a MacBook Pro for work. Thus, some of my archived videos are MKV, and Plex has had some issues recognizing the files. Converting them to mp4 solved this. The easiest way to do this is to use ffmpeg. The command looks like this:

```
ffmpeg -i inputfile -codec copy outputfile
```

Replace inputfile with the actual filename and path, and

outputfile with the destination. This will be a relatively quick process, since the codec works in either mkv containers, or mp4. So ffmpeg just has to copy it over, and resave it.

RAZER DEVICES

I recently purchased a Razer DeathAdder Elite. The reason I chose that over something else: the shape fits my hand better than any other mouse I've ever tried. However, since it's an extremely new product, the support from unofficial drivers isn't there yet. For anyone who is using a supported device, you'll want to install Razercfg, and use the GUI (qrazercfg) to configure the chroma lighting effects. For some devices, you may also want to check into razercommander, or some driver packages.

BACKUP SOLUTION

I use borg and cron to back up a snapshot of my devices to our NAS every day. So far, I haven't ever had

to restore anything. However, the snapshots allow me to roll back specific changes, instead of everything, which is convenient. It also saves only changes, so the size of the backups is manageable.

QUESTIONS, REQUESTS, AND RECOMMENDATIONS

I realize this month's article is rather short. For anyone who has ideas for articles - be it a question, a request for a review/tutorial, or recommendation into software or approaches I may want to look into - you can send me an email at lswest34+fcg@gmail.com.



Lucas has learned all he knows from repeatedly breaking his system, then having no other option but to discover how to fix it. You can email Lucas at: lswest34@gmail.com.

THE FULL CIRCLE WEEKLY NEWS



A short podcast (<10min) with just the news. No chit-chat. No time wasting. Just the latest FOSS/Linux/Ubuntu news.

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Welcome back for another entry into what I lovingly call 'Greg's Python Folly'. As promised, we will be working on interfacing a stepper motor to the Raspberry Pi. You will need your Raspberry Pi, a hobby stepper motor, a 4 x AA size battery pack, the L293D driver chip we used previously, a breadboard, and some jumpers.

While I was doing research for this particular project, I stumbled across a tutorial at tutorials-raspberrypi.de. I was so impressed by the information at this website, I am using the majority of their information and code in this article. The website is: <http://tutorials-raspberrypi.com/how-to-control-a-stepper-motor-with-raspberry-pi-and-l293d-ult2003a/>. If you get confused by my explanations, you can always drop by and maybe get some clarifications.

The motor I chose is a Radio Shack mini stepper motor. Basically it is a 28BJY-48 low-voltage stepper. Before you try to

interface any stepper motor, please research the data sheet for as much information as you can get. In this case, the data sheet is located at: <http://www.tutorials-raspberrypi.de/wp-content/uploads/2014/08/Stepper-Motor-28BJY-48-Datasheet.pdf>

Now, let's examine stepper motors in general, then we'll expand that information to the 28BJY specifically and work on interfacing it to the Pi through our L293D driver chip.

STEPPER MOTORS

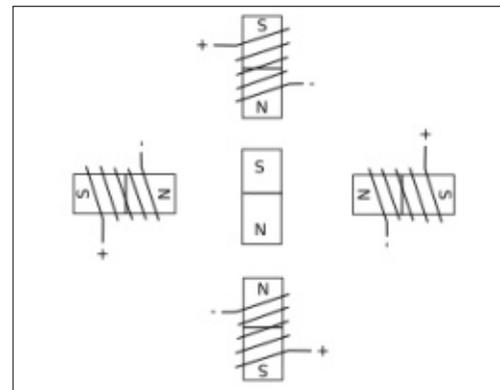
Stepper motors are used in robotics and in CNC type machines where you want the ability to move an item to a specific location easily. There are two basic types of stepper motors, one called Unipolar and one called Bipolar. The difference will become obvious as we go through this tutorial. The 28BJY is a Bipolar motor and also has a gearing system.

In both models, there are

multiple electromagnetic coils that are turned on and off in a sequence to make the motor turn. Each time we apply power to one of the coils, the motor rotates a small amount (if powered in the correct sequence for the motor), called a step, hence the name stepper motor.

UNIPOLAR MOTORS

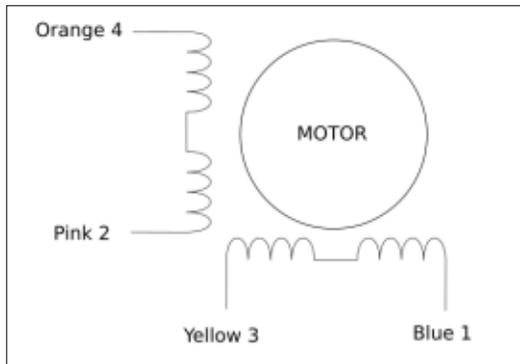
Unipolar motors have coils that are powered in only one direction, hence the UNI in Unipolar. The rotor of the motor is controlled by powering the various electromagnetic coils on and off in a specific sequence for a certain amount of time. In a simplified version of this model, let's look at the following diagram...



Turning on each coil one at a time will cause the magnet in the rotor to turn toward the proper coil. Using a clock face as a guide, turning on the coils in the sequence of 12 o'clock, 3 o'clock, 6 o'clock, 9 o'clock and then again at 12 o'clock will cause the rotor to turn clockwise one full rotation. This requires 4 "steps" to make one rotation. This is called the Unipolar wave. If we go a bit further, we could make a more granular movement by alternating the coils from a single coil turned on and then turning on the next coil as well, which makes the rotor turn in an eighth turn when both coils are turned on. The sequence would then be: 12, 12 and 3, 3, 3 and 6, 6, 6 and 9, 9, 9 and 12, and then finally 12 alone again. This then is 8 steps per rotation which is called half stepping. To make the motor reverse (counter-clockwise), we simply reverse the sequence. This is a VERY simple representation, and many stepper motors have a resolution that can be as high as 200 steps per revolution.

BIPOLAR MOTORS

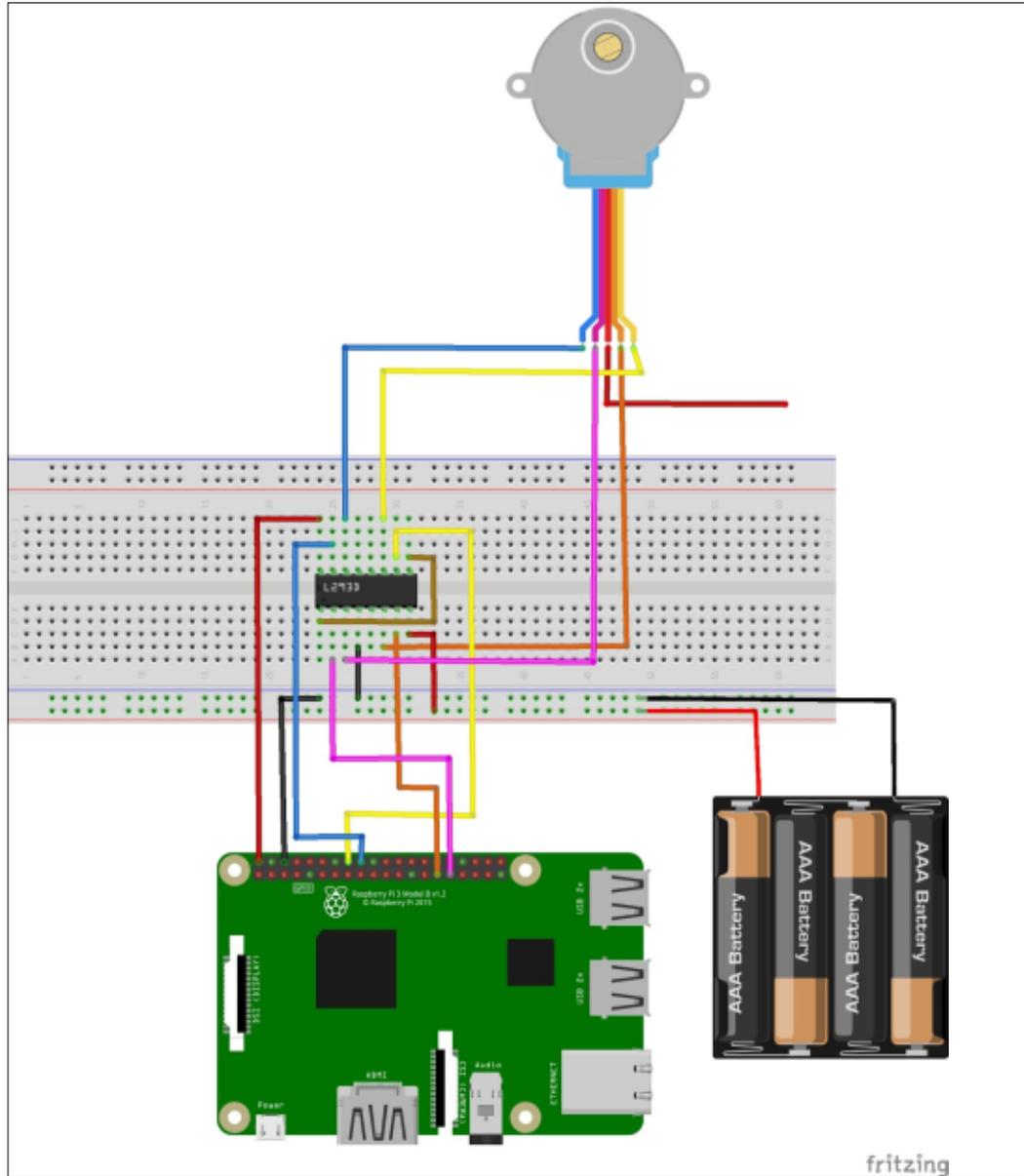
The 28BJY, as I stated earlier, is a Bipolar motor. In this case, the coils can have their current reversed and two coils are powered at any time. This creates a situation where the switching is more complex, but the amount of turn force (power) of the rotor is increased. A simple block diagram of the 28BJY is shown below.



The numbers shown with the colors of the wires are for the 28BJY and yours may be different. The wire connector (if there is one) might differ from unit to unit. You can use an ohmmeter to verify the coils.

THE WIRING

A couple of words of warning on this before we start.



First, do all of your wiring BEFORE you power on the Raspberry Pi. We are working with an external power source, so you

want to make sure that you don't short any wires or apply the battery power to the wrong pin.

Second, BE SURE of your wiring before you power on your RPi. If

you get the wiring confused, at best your project will not work and the motor will just sit there and buzz.

When you look at the fritzing drawing, it looks fairly simple (and it is). I made sure that the wiring from the RPi to the driver chip were the same color as the intended segment of the motor. We will be using only 4 of the 5 motor wires. The red one (if yours has a red one) is not connected for this project.

Since the central component in this project is the L293D driver chip, here is a quick breakdown to try to make things easier for you...

- L293D**
- Pin 1 -> Pin 9
 - Pin 2 -> Pi GPIO 6
 - Pin 3 -> Motor Pink
 - Pin 4 -> Breadboard Negative Rail
 - Pin 5 -> No Connect
 - Pin 6 -> Motor Orange
 - Pin 7 -> Pi GPIO 5
 - Pin 8 -> Breadboard Positive Rail
 - Pin 9 -> Pin 1
 - Pin 10 -> PI GPIO 23
 - Pin 11 -> Motor Yellow
 - Pin 12 -> No Connect
 - Pin 13 -> No Connect
 - Pin 14 -> Motor Blue
 - Pin 15 -> Pi GPIO 24
 - Pin 16 -> Pi +5VDC

If you follow this, you should have no problems with the wiring.

THE CODE

As always, I will discuss the code in blocks. So let's get started.

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
coil_A_1_pin = 6 # pink
coil_A_2_pin = 5 # orange
coil_B_1_pin = 23 # blue
coil_B_2_pin = 24 # yellow
```

Here we are simply defining the imports, setting the GPIO mode, and setting the warnings to False so we don't get any nagging notices about already initialized pins. We also define which GPIO pins control the motor coils through the driver chip.

```
# adjust if different
StepCount = 8
Seq = range(0, StepCount)
Seq[0] = [0,1,0,0]
Seq[1] = [0,1,0,1]
Seq[2] = [0,0,0,1]
Seq[3] = [1,0,0,1]
Seq[4] = [1,0,0,0]
Seq[5] = [1,0,1,0]
Seq[6] = [0,0,1,0]
Seq[7] = [0,1,1,0]
```

Now this is the key to making our project work. This motor wants

```
def forward(delay, steps):
    for i in range(steps):
        for j in range(StepCount):
            setStep(Seq[j][0], Seq[j][1], Seq[j][2], Seq[j][3])
            time.sleep(delay)

def backwards(delay, steps):
    for i in range(steps):
        for j in reversed(range(StepCount)):
            setStep(Seq[j][0], Seq[j][1], Seq[j][2], Seq[j][3])
            time.sleep(delay)
```

These two routines allow for easily commanding the motor forwards or backwards a specific number of steps in the proper direction.

```
if __name__ == '__main__':
    while True:
        delay = raw_input("Time Delay (ms)?")
        steps = raw_input("How many steps forward? ")
        forward(int(delay) / 1000.0, int(steps))
        steps = raw_input("How many steps backwards? ")
        backwards(int(delay) / 1000.0, int(steps))
```

to have 8 steps (internal) per revolution of the motor (per the data sheet). We also define the sequence of which coil(s) are energized per step as a series of lists. Each sequence array explains which coil(s) is energized at any given time.

```
GPIO.setup(coil_A_1_pin,
GPIO.OUT)
GPIO.setup(coil_A_2_pin,
GPIO.OUT)
GPIO.setup(coil_B_1_pin,
GPIO.OUT)
GPIO.setup(coil_B_2_pin,
GPIO.OUT)
```

Here we are going through the

setup steps, defining each of our pins used as outputs.

```
def setStep(w1, w2, w3, w4):
GPIO.output(coil_A_1_pin, w1)
GPIO.output(coil_A_2_pin, w2)
GPIO.output(coil_B_1_pin, w3)
GPIO.output(coil_B_2_pin, w4)
```

This subroutine is called each time we want to step the motor and we pass a 0 or 1 to each coil wire port on the driver chip to energize or deenergize the various coils to turn the rotor.

And finally our "main" routine which loops over and over again asking the amount of the time delay and the number of steps in that given direction. For my motor, it takes 512 steps to make close to a full rotation.

On my system, with my motor, a time delay of 1ms works well. However, you might have to add a few milliseconds to yours for it to work.

Notice I stated that it takes 512 steps to make CLOSE to a full

rotation. This motor has a 64:1 gearing ratio, which leaves a rather ugly fractional step angle. But for the purposes of this tutorial, it works pretty well.

If you want to learn more about stepper motors, adafruit.com has a very nice article on the subject.

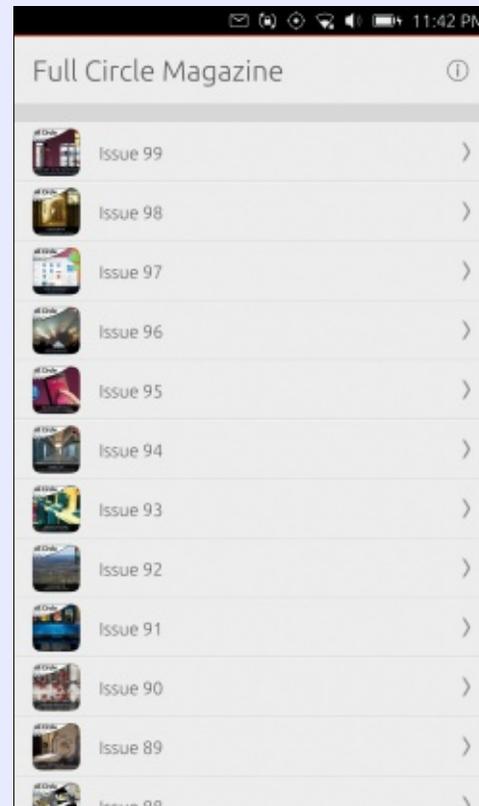
Hopefully you have enjoyed the series so far. Next up will be learning to use the Arduino microcontroller board. We'll use this information in the third section of the series where we control the Arduino with a Raspberry Pi (or other computer). So, that having been said, you should be ready and have an Arduino (Uno or Mega) ready and dust off the components we used in the early part of this series for next time.

Until then, keep learning and above all, HAVE FUN!



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THE OFFICIAL FULL CIRCLE APP FOR UBUNTU TOUCH

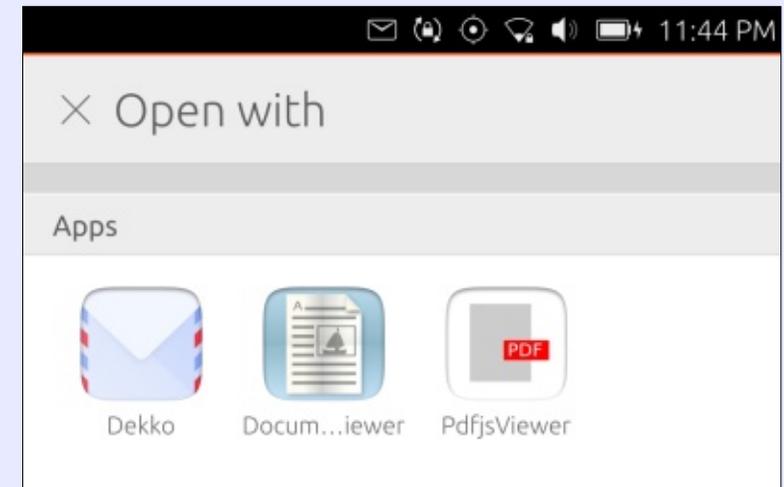
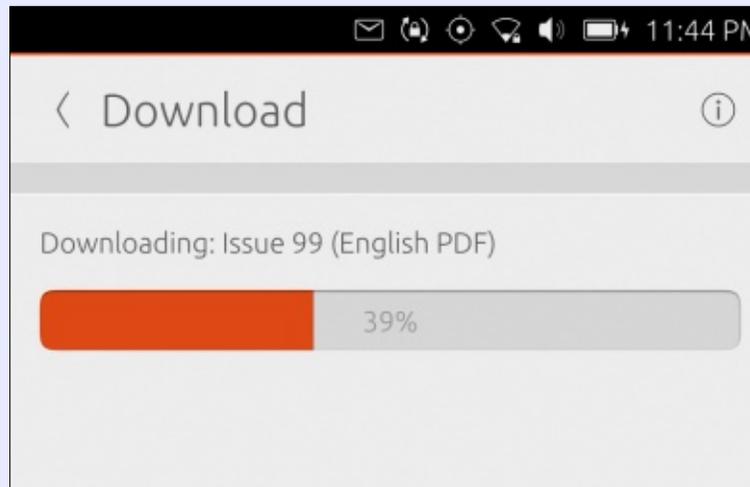


Brian Douglass has created a fantastic app for Ubuntu Touch devices that will allow you to view current issues, and back issues, and to download and view them on your Ubuntu Touch phone/tablet.

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>





Every now and again, I trip myself up when I'm trying to send outbound email from the command-line via a script or an application. A seemingly simple task such as changing the sender's email address can sometimes take lots of time to get working. What follows will hopefully get you closer to a solution a little quicker.

Even if you have an MTA (Mail Transfer Agent) like the excellent Postfix (<http://www.postfix.org>) installed, you might need to alter the sender email address (or the "from line") to reflect that your email is coming from a specific script, on a specific machine and not just the all-too-familiar "root@localhost".

Step forward the "mail" utility. There are multiple historical versions and throwbacks of the "mail" utility but that discussion is for another day. If you're using a Red Hat derivative, then you might be better trying to install "mailx" or "nail" to achieve the following functionality, but beware that your results may differ. However, on

Ubuntu and Debian (on most versions), you should be fine with the "heirloommailx" package. Install it simply, as follows:

```
aptget install heirloommailx
```

Consider for a moment this busy command-line example:

```
mailx r 'mycustom-
sender@chrisbinnie.tld' s
'Your Subject Line' a
'/fullpath/myattachment' S
'smtp=localhost'
'destination@chrisbinnie.tld'
```

Let's look a little closer. You can easily change the "r" option to configure which "from line" is presented to the mail client when the email is picked up at the other end. This is sometimes surprisingly difficult to get working with other command-line mail clients.

The other options hopefully make sense too. The "s" option allows you to edit your email's subject whereas the "a" option is the filename of the attachment that you are adding from your local filesystem. One handy hint is to compress the file if the plain text

arrives with extra, unwanted carriage returns. Incidentally you should also ensure that you're using the full path to the attached file if you have issues.

Take careful note that the above command-line example isn't strictly complete and can either be terminated successfully with "</dev/null" appended to the end of it or alternatively by manually typing a dot and then hitting the "Enter" key. This is to populate the body of the email with some content, even if the content is non-existent and effectively it's an empty email.

Compare and contrast the command-line example above and the one below; here our empty email has no body at all thanks to "/dev/null" populating it:

```
mailx r 'mycustom-
script@chrisbinnie.tld' s
'Another Subject Line' a
'/fullpath/yourfile' S
'smtp=remotesmartMTAhost'
'destination@chrisbinnie.tld'
< /dev/null
```

I'm pointing this out because

you could also insert a text file into the body by replacing "</dev/null" with something like this example "</home/chrisbinnie/bodytext". The file "bodytext" is the email's body in this case.

Consider this scenario now for a second: you don't want to insert a whole file but instead send some other text directly from your command-line. You can also follow this now familiar format by echoing text through a pipe:

```
echo e "Text content goes
here.\n And here." | mailx r
'script@binnie.tld' s
'Subject Line' a
'/fullpath/.bashrc' S
'smtp=localhost'
'chris@binnie.tld'
```

I haven't yet explained that the "S" option lets you choose a remote MTA, like "smtp=smtp.mail.com" as an example, or a local machine (as we have seen in our command-line examples above).

Note that it's easy to add multiple email addresses for the recipients (simply separating them

by spaces).

Before we stop looking at command-line email, let's quickly think about an alternative to solving the problem of changing the "from line" or sender name. It's not too tricky (I'm sure you'll be glad to read).

Another command-line email client option is to install "mutt" in case you can't get your hands on a "mailx" derivative. In order to use it, you have to edit the ".muttrc" file, found in the home directory of the user who is sending the email. Here's an example:

```
set realname="Alerting
Script" set
from="script@production-
machine.com" set use_from=yes
```

In the ".muttrc" text above, the "realname" option would usually be a person's name; clearly it can be useful to set it – to tidy up e-mails as they are received.

There's lots more information on the superb Mutt (<http://dev.mutt.org/trac/wiki/MuttFaq/Header>), and it's clever enough to achieve everything we've covered with the "mail" command.

Personally, I prefer the "mail" command for this task, but, hopefully, you're now armed sufficiently so that you can choose between the two alternatives above.



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<http://www.linuxserversecurity.com>



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 previous part of the series, we deviated a bit from Free Vision and went into the technical details on how to use the CURL library from Pascal to connect to an RSS feed on FCM's content management system. At this stage, we know how to connect to the server and download an XML file containing a list of recent articles published on the web page. In this part, we will see how to parse the XML code to retrieve the information we are aiming for: issue numbers and download URLs. We will then put it all together,

and update the database our application uses with fresh data from the Web.

UNDERSTANDING THE XML LANGUAGE

EXTended Meta Language (XML) is a simple text-based language that aims to structure data as a tree: each data element may have none, or several child nodes. On the other hand, each element must have a single parent element - except for a single node in the entire tree, which is then called the root element. Each element should open with a start tag, such as `<element>`. The corresponding ending tag would be `</element>`.

Perhaps an example may help. If we wish to codify a library, for instance, our root element will be the library itself. This library may then contain an element defining its owner, and perhaps another giving the date on which the data set was compiled. Finally, we will need to create an element for each book in the library, giving its title

```
<?xml version="1.0"?>
<library>
  <owner>Myself</owner>
  <date-compiled>2016-07-17</date-compiled>
  <book>
    <title>Such a Long Journey</title>
    <author>Rohinton Mistry</author>
  </book>
  <book>
    <title>Coming out of the Shadow</title>
    <author>Janusz A. Zajdel</author>
    <genre>Science Fiction</genre>
  </book>
</library>
```

and author.

The beauty of this scheme is that it may easily be adapted for different purposes in a flexible manner. For instance, in the above example, one of the books has been marked with a genre, while another has not.

Writing a program to transverse

a data set in XML has its own challenges; luckily for us, the Free Pascal project has foreseen the use of a set of standard classes that may be implemented for our own purposes. Let us write a simple program that reads in an XML file, and outputs on screen each element name in sequence, or its value if it is a text element that simply contains text. To begin with,

```
uses
  Classes, XMLReader, XMLTextReader, XMLUtils;

var
  f : TFileStream;
  reader : TXMLReader;
  settings : TXMLReaderSettings;
  input : TXMLInputSource;
```

let us include the standard and XML classes and define our variables (previous page, bottom right).

The TFileStream will be used to access the XML file on our local disk, and make it available to a TXMLReader through an adaptor class, TXMLInputSource. The TXMLReaderSettings object is needed to pass parameters to the reader.

We begin by configuring the settings, basically telling the reader to ignore supplementary whitespace (actual spaces, but also line breaks and tabulations), and to use XML namespaces if available - though we will not need them here:

```
settings :=
TXMLReaderSettings.Create;

settings.PreserveWhiteSpace
:= false;

settings.Namespaces := true;
```

We access the file, and create a TXMLInputSource from the resulting stream:

```
f :=
TFileStream.Create('test.xml'
, fmOpenRead);
```

```
reader := TXMLTextReader.Create(input, settings);
while reader.Read do
begin
  if reader.NodeType <> ntSignificantWhitespace then
  case reader.NodeType of
    ntElement: Writeln ('Beginning ', reader.name, ' element');
    ntText: Writeln (' element content: ', reader.value);
  end;
end;
```

```
input :=
TXMLInputSource.Create(f);
```

Now (shown above) we can create our TXMLTextReader, and have it parse each element encountered.

Finally, let's not forget to close the file stream neatly:

```
f.Free;
```

The code for the complete program is available at this link: <http://pastebin.com/PtciSAQb>.

PARSING OUR RSS FEED IN XML

```
<channel>
  <title>Ronnie &#8211; Full Circle Magazine</title>
  <description>The independent magazine for the Ubuntu Linux community.</description>
  <item>
    <title>Full Circle Touch app updated!</title>
    <link>http://fullcirclemagazine.org/2016/06/25/full-circle-touch-app-
updated/</link>
  ...
```

In the last part of this series, we obtained the RSS for Full Circle Magazine using the CURL library. This is a piece of XML data, with the following structure. It has been cleaned up a bit to showcase relevant elements (shown below).

So, what we want to do is isolate individual <title> elements, and, within each element, the corresponding <link>. We have on the one hand a routine from CURL that fetches the contents of a URL, and produces a readable Stream. On the other hand, we have an XML parser that can parse a writable Stream. The link is obvious: we now need a

mechanism to pipe data from the first stream into the second, and, in Free Pascal, this mechanism is a piped stream. Let's do it. First, we will need a double set of variables (next page, top right).

The first set are those used for the CURL library, the second will be the input and output streams to be parsed together, and the third set is for the XML parser. Finally, the two strings and associated boolean variables will be needed to link each element (of type ntElement) with its associated value (type ntText) - which is not the element itself, but a sub-element inserted inside the parent element. Unfortunately, this

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textual element is not always in the first position among the element's children, so a rather convoluted set of flags (the boolean variables) must be used to detect them.

We will not go over either the use of the CURL library, that has been described in the previous part of this series, or over the XML parser. We will concentrate instead on the use of the piped streams. We will create the two streams together:

```
CreatePipeStreams (inPipe, outPipe);
```

The CURL library can then be created using the outPipe section, to which it will write the data obtained from the Internet:

```
curl_easy_setopt (hCurl, CURLOPT_WRITE_DATA, [Pointer (outPipe)]);
```

The XML reader's input will be connected to the inPipe section, from which it will read back the bytes:

```
input := TXMLInputSource.Create (inPipe);
```

Finally, the XML reader's main

loop can be configured to detect title/link pairs. For the time being, they will simply be output on screen (shown bottom right).

The complete program can be found at this link:

<http://pastebin.com/ciVGXvy6>.

Integrating XML parsing into our Free Vision application

At this stage, we have on the one hand a working Free Vision application, that consults its internal SQLite database of FCM issues and gives the result in a scrolling list on screen. On the other hand, we have a mechanism to connect to the Internet and update the database. Now, we need to connect the two, so that the database is updated before the data is shown to the user.

Perhaps the most elegant way of doing this - and the least expensive in terms of writing code - is to create a new Dialog type. Called TUpdateDialog, it will be shown on screen just before TDisplaySQLDialog is created. So, in the main application's HandleEvent procedure, we have what's shown on the next page, top right.

```
var
  URL : Pchar =
    'http://fullcirclemagazine.org/author/ronnie-2/feed/';
  hCurl : pCurl;

  inPipe : TInputPipeStream;
  outPipe : TOutputPipeStream;

  reader : TXMLReader;
  settings : TXMLReaderSettings;
  input : TXMLInputSource;

  title, link : string;
  nextTextIsTitle, nextTextIsLink : boolean;
```

```
while reader.Read do
begin
  if reader.NodeType = ntElement then
    if reader.name = 'title' then begin
      nextTextIsTitle := true;
      nextTextIsLink := false;
    end else if reader.name = 'link' then begin
      nextTextIsTitle := false;
      nextTextIsLink := true;
    end else begin
      nextTextIsTitle := false;
      nextTextIsLink := false;
    end;
  if reader.NodeType = ntText then
    if nextTextIsTitle then begin
      title := reader.value;
      nextTextIsTitle := false;
    end else if nextTextIsLink then begin
      link := reader.value;
      nextTextIsLink := false;
      Writeln (title, ' -> ', link);
    end;
end;
```

The TUpdateDialog will need no outside inputs, since it will always be using the same target URL to connect to the Internet, and local

database filename to append any data found on new issues of FCM. This Dialog will just need a constructor that builds it, and sets off the process:

```
TUpdateDialog =  
object (TDialog)  
    constructor Init  
    (FileName : String);  
    end;  
    PUpdateDialog =  
^TUpdateDialog;
```

This constructor procedure will need a whole lot of variables, but they can be classified into separate categories. We will need:

- A TRect and PLabel to set up this Dialog on screen; this is the Free Vision part.
- A URL and PCurl to get to the Internet and retrieve a stream accessing FCM's feed.
- Two pipes, to set up the connection between the incoming stream from the Internet, and an outgoing stream towards the XML reader.
- The XML reader itself, associated settings, and several variables to identify each new issue's identification code (e.g. '111'), title

('Full Circle Magazine #111') and download link.

- A handler for the SQLite connection to the local database.

So, have a look at the code shown bottom right.

Most of the code will not be reproduced here, since it is in essence a mashup of that written in our previous part and the beginning of this one. Salient points would include the use of a Regular Expression parser (regexp) in order to parse the titles from the XML stream, identifying which contain the text identifying a new issue of FCM. We are looking for something such as '#109', '#110', '#111' ..., so basically a pound sign '#' followed by a series of digits. This can be made systematic with the following code:

```
re := TRegExpr.Create;  
re.Expression := '#[0-9]*';
```

```
if re.Exec(reader.value) then  
begin  
    pos := re.MatchPos[0];  
    len := re.MatchLen[0];  
    issue := Copy(reader.value, pos+1, len-1);  
    if issue <> '' then begin  
        articleTitle := reader.value;  
        nextTextIsTitle := false;  
    end;  
end;
```

```
pOpen := New(PFileDialog, Init('*.*db', 'Open', 'File ~N~ame',  
fdOpenButton, hcNoContext));  
result := ExecuteDialog (pOpen, @FileName);  
if not (result = cmCancel) then  
begin  
    pUpdate := New(PUpdateDialog, Init(FileName));  
    ExecuteDialog(pUpdate, nil);  
    pDisplay := New(PDisplaySQLDialog, Init(FileName));  
    ExecuteDialog (pDisplay, nil);  
end;
```

```
constructor TUpdateDialog.Init (FileName : String);  
var  
    R : TRect;  
    msgLabel : PLabel;  
  
    URL : Pchar =  
'http://fullcirclemagazine.org/author/ronnie-2/feed/';  
    hCurl : pCurl;  
  
    inPipe : TInputPipeStream;  
    outPipe : TOutputPipeStream;  
  
    reader : TXMLReader;  
    settings : TXMLReaderSettings;  
    input : TXMLInputSource;  
  
    sql : TSQLite;  
    n : integer;  
  
    issue, articleTitle, articleLink : string;  
    nextTextIsTitle, nextTextIsLink : boolean;  
  
    re : TRegExpr;  
    pos, len : integer;  
    newItem : integer;
```

We can now use 're' as a regular expression reader in the following way, to identify if the next value found by the XML reader contains the expression we are looking for.

If so, it can be isolated and used to prime the issue code for insertion into the database (shown bottom left).

Now, all we need to do is

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determine, for each issue announcement found in the XML stream, if this issue is already inside our database. To so do, we will need to get back to the SQLite driver, and search the existing issues with the same identifying code. If a match is not found, this issue is a new one and needs to be appended to the existing table (shown top right).

Once the XML code has been completely parsed, we can alter the label on the Dialog to notify the user of how many new issues

```
sql.Query('select id from issues where id="' + issue + "'", nil);
n := sql.List_FieldName.count;
if n = 0 then begin
    inc(newItems);
    sql.Query('insert into issues values("' + issue + '", "' + articleTitle + '", "", "' +
        articleLink + '", "")', nil);
end;
```

of FCM have been found. In my case, my database had been initialized by hand with issues 108, 109 and 110. I launched the application, and several new issues were detected from the XML feed: previous issue 107, and newer issue 111. This last one was identified twice, since two

different posts on FCM's feed referenced this issue, but was inserted only once into the database.

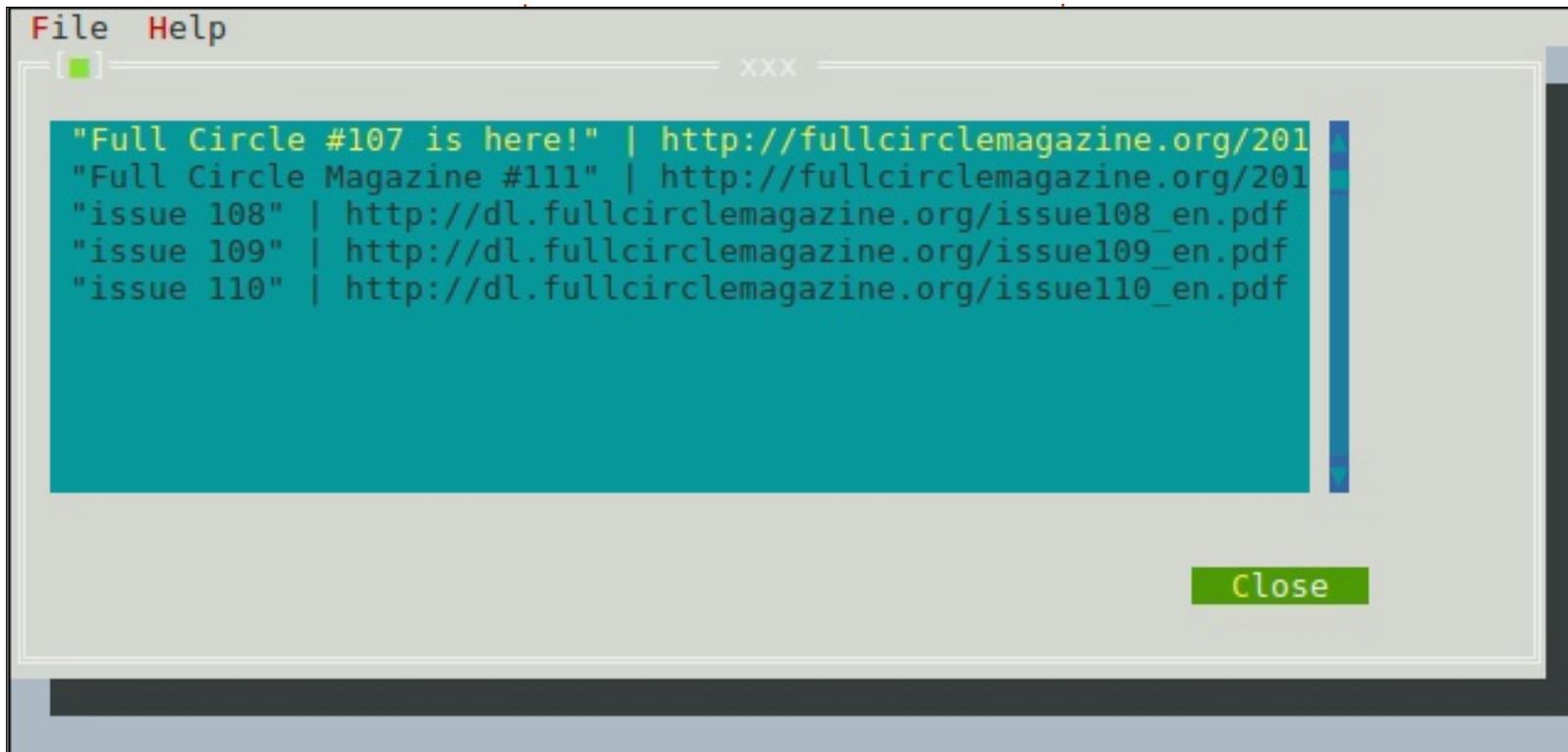
```
msgLabel^.Text :=
NewStr('Found ' +
IntToStr(newItems) + ' new
issues...');

DrawView;
```

The finalized application's code can be found here:

<http://pastebin.com/H422xg3V>.

In this part of the series, we put our complete application together using Free Vision for the user interface, SQLite to create a local data, and CURL and XML to retrieve fresh data from an RSS feed from the Web to update our database. In the next part, we will see various ways in which our application can run on a Raspberry Pi.



The screenshot shows a window titled "Full Circle Magazine #115" with a "Close" button. The window contains a list of issues with their corresponding URLs:

```
"Full Circle #107 is here!" | http://fullcirclemagazine.org/201
"Full Circle Magazine #111" | http://fullcirclemagazine.org/201
"issue 108" | http://dl.fullcirclemagazine.org/issue108_en.pdf
"issue 109" | http://dl.fullcirclemagazine.org/issue109_en.pdf
"issue 110" | http://dl.fullcirclemagazine.org/issue110_en.pdf
```



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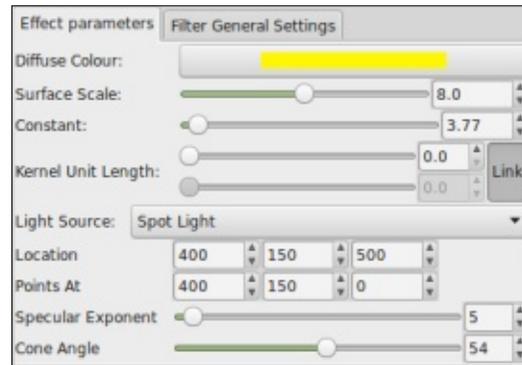


This month we'll be looking at the last of the filter primitives available in Inkscape 0.48, Diffuse Lighting and Specular Lighting. These are used to simulate the effect of lights shining on your objects, and constitute two thirds of the Phong reflection model. The third part, Ambient Lighting, refers to light that's present everywhere in an image rather than coming from a specific light source. There's no need for a specific filter for this part as it is formed by the fill and stroke colors of the objects in your image.

Diffuse Light refers to the general light and shadow on an object that doesn't change significantly as you move your viewpoint. Specular Light, on the other hand, refers to the bright spots or reflections that shift and change as you move. Look at a shiny object near you and move your head around to see the difference – notice the specular highlights on edges and corners that move with you, and the diffuse shadows and glows of the main body of the object that

remain largely unchanged.

To begin, create an object or group to apply the filter to, and then add a Diffuse Lighting primitive in the usual way. There are a few parameters to modify, but mostly it's a case of moving sliders by trial-and-error in order to achieve the result you want.



The first parameter to choose is the color of your light. This has a huge effect on the output of the filter, as the lighting effect completely replaces the original color of your objects, rather than mixing with the underlying hues. In the example that follows, all the text objects are teal (a blue-green color), but the color used in the filters is yellow. Notice that no teal

appears in the output images.

In practice, it's only the alpha channel of the input image that's used by this primitive – so it doesn't matter whether you connect it to the full Source Graphic or just the Source Alpha, the result will be the same. The alpha channel is used as a “bump map” to determine each pixel's position along the z-axis – more opaque areas protrude further from the background. The Surface Scale and Constant sliders can be used to scale and offset the alpha values in order to alter the apparent depth of the object.

The Kernel Unit Length parameter can be largely ignored. It's not used by Inkscape, but may have an effect on other SVG viewers, where it's used to define the size of the pixel grid used for the filter calculations. I usually just leave it at zero.

Finally, it's time to choose the type of light source: Distant, Point, or Spot. The first indicates a light source that is an infinite distance

from your object, such that all the rays of light that arrive are parallel to one another. The Azimuth parameter sets the location of the light source as an angle – 0° places it to the right of your object, with increasing values moving it clockwise around the image until 360° puts it back at the right again. Drag this slider to see the effect in real-time. The Elevation parameter sets the angle to the drawing plane: imagine a light sitting flush with your computer screen at 0° (casting low, dark shadows); as you move the slider towards 90°, the light swings out of the monitor, towards you, until it's directly over your objects; continue towards 180° and it carries on following the same arc until it's flush with the monitor on the opposite side of your image; any further values continue moving the light in a semicircle behind the monitor, and tend to not be particularly useful.

Specifying two polar values like this defines a bearing in three-dimensional space. If you ever watch an episode of Star Trek where a crew member states their

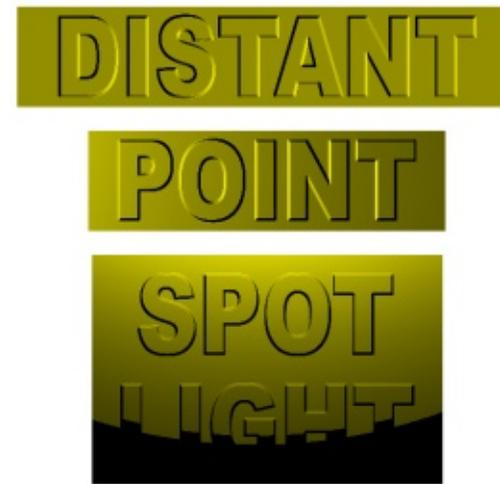
course as “249 mark 38,” this is what they're doing – just stating an azimuth and elevation to describe the direction the ship should head in. It always amazes me that they're able to judge those values to the nearest degree, but then I haven't had the benefit of a Starfleet Academy stellar cartography course!

With two polar values able to define a bearing, it only takes a third parameter, distance, to specify a particular point in space. When selecting the Point Light option, you might expect to see the same two sliders, joined by a third. But the SVG working group decided that defining a specific point in 3D should be done using Cartesian coordinates, so instead you have three anonymous fields with a single “Location” label, representing the location of the point light using x, y and z coordinates. There's no means to graphically pick an x and y location on the canvas, and the values are in terms of the coordinate system of the object being lit (which is not necessarily the same as the coordinate system of the main drawing). So, yet again, it's down to some trial and error.

Whereas the Distant Light, at its infinite distance from the scene, projects an even illumination, the Point Light is far more nuanced. It illuminates areas near to the light source more than those at a distance, leading to gradients in the final color.

The Spot Light option is even more precise in its effect. This requires two sets of coordinates – one to specify the location of the light, and the other to define the direction it's pointing in (which is actually achieved by specifying the point in space it's aiming at). The light is projected in a cone from the source to the target, with an additional two sliders to set the characteristics of that cone: the Specular Exponent sets how focused the light is, whilst the Cone Angle defines the shape of the cone. The cone has a hard edge to it; any points outside it will not be illuminated at all, so you will need additional filter steps if you want a softer edge.

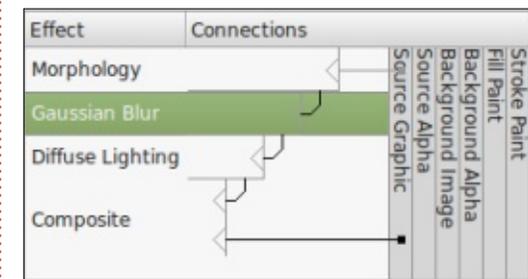
This example shows the three types of light in use on some text objects, all of which are actually blue as their base color!



You'll notice how “flat” all of these are. Because the bump map is created from the alpha channel of the input image, and our input image has alpha values of only 0 and 255, there's no scope for gentle transitions in height. If you want a softer edge to your lighting you'll need to introduce some variety in the alpha channel. The easiest way to do this is by using a Gaussian Blur primitive to the input image.

Just adding a blur will tend to spread the edge of your text outwards as well as inwards (second image in the next example). For a more pronounced effect, it's often worth using a Morphology filter to erode the input image before you blur it. By

thinning your objects first, the full extent of the blur can be kept inside the boundaries of the original shapes (third image). If you then add a Composite filter, set to “In”, to the output of your lighting primitive, you can clip the result to give you something more like the rounded text you were probably looking for (fourth image).



Still we're left with that yellow color from the lighting filter. This is where the “Arithmetic” option of the Composite filter comes in (re-read part 50 if you need a refresher on this primitive). The output from the Diffuse Light filter

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is intended to be multiplied with the source image in order to overlay the lighting effect onto the underlying objects, but rather than providing a nice, obvious shortcut to this operation, the Inkscape UI just exposes the parameters of the underlying SVG model. For each channel of each pixel, the Arithmetic operator performs the following calculation:

$$\text{result} = (K1 \times i1 \times i2) + (K2 \times i1) + (K3 \times i2) + K4$$

Where K1-4 are constants set in the UI, and i1 and i2 represent the values from a pair of input images. By setting K1 to 1.0 and all the other constants to 0, this equation simplifies down to:

$$\text{result} = i1 \times i2$$

In other words, a simple multiplication of input values, which is exactly what we want. Changing the “In” operator in the previous filter chain to “Arithmetic”, and setting the constants to 1, 0, 0, 0 results in a



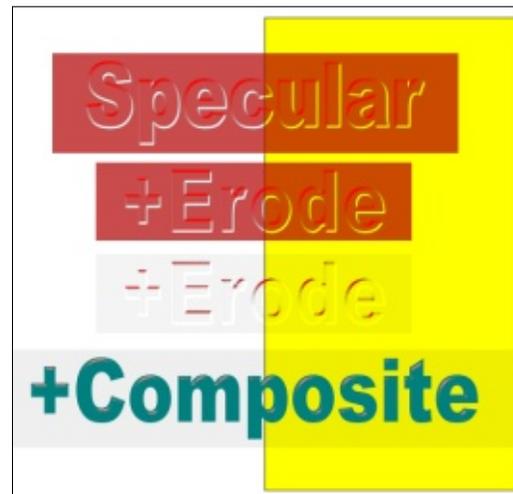
green-looking output – the result of shining yellow light on a teal object.

Now we have an illuminated object whose base color has an effect on the output. This is obviously much more flexible than the simple “In” operator, which would have us changing the lighting color in the filter itself every time we want to alter the result. If you're worried about losing the “clipping” effect of the “In” operator, don't be: the multiplication operator also applies to the alpha channel, so all those areas in the source image with alpha=0 will result in transparent pixels in the output as well.

Moving on to the Specular Light filter, things look pretty similar in the filter UI. There's one additional parameter, but otherwise it's all the same as for the Diffuse Light primitive. That extra parameter is “Exponent” which, according to the SVG spec and the Inkscape tooltip, is used to make the specular lighting more “shiny”.

Unlike Diffuse Light, this filter results in an image with mixed alpha values. Watch out for this, as

seemingly bright reflections might actually just be a white background showing through! In the following image you can see that effect quite clearly on the first and second examples, where bright white “reflections” to the left of the filtered text are exposed as holes in the alpha channel once the yellow background is added behind them. Note that I've used a red Point Light in these examples, but still with teal text as the original object.



The four images above show the effect of the Specular Light filter on the plain text, then on an eroded version of the same. I didn't add a Gaussian Blur this time, as I wanted the specular reflections to be sharp and clear. Cranking up the Exponent value in the third image

gets close to an output that just shows the highlights, which can then be added back to the original source image again using another Composite Primitive (fourth image).

This time the “Arithmetic” mode is used again, but with values of 0, 1, 1, 0 – which has the effect of reducing the equation down to:

$$\text{result} = i1 + i2$$

This primitive therefore adds the reflections to the original image, which is the recommended approach from the SVG specification. Note, however, that a little background opacity has also sneaked through, so you might want to apply another Composite Filter, set to “In”, to ensure that the result is clipped to the shape of your original objects.

Finally it's time to combine both lighting filters to produce a fully lit object, with both diffuse and specular light. Once again, the original text is teal, so the yellow diffuse light gives it a green



HOWTO - INKSCAPE

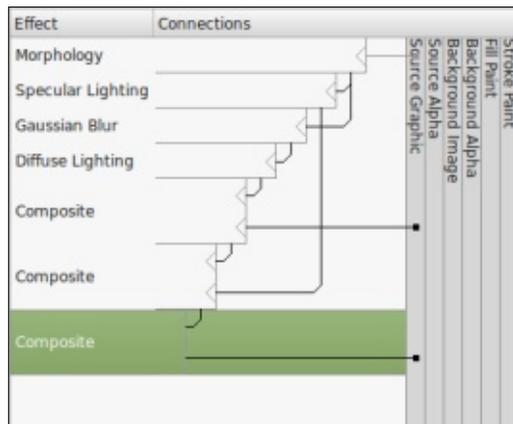
appearance – but you can also see the glinting highlights from the red light source of the specular filter making an appearance.

The full filter chain for this effect isn't too complex if you take it one step at a time. First the Morphology primitive erodes the text of the Source Graphic a little, with the output from that going straight into the Specular Lighting primitive, to give those sharp, red highlights. The Morphology output also goes to a Gaussian Blur to soften the image before it's used in the Diffuse Lighting primitive.

From there, it's just a matter of combining everything together: the first Composite filter ("Arithmetic" mode: 1, 0, 0, 0) multiplies the Source Graphic with the output from the Diffuse Lighting. The second Composite

("Arithmetic" mode: 0, 1, 1, 0) adds in the Specular Lighting highlights. Although the result is almost perfect, there was a slightly visible background, albeit with a low alpha value. A third Composite filter ("In" mode) simply tidies everything up a bit.

Although they're no match for real raytracing or 3D modelling, the lighting effects in SVG can be useful for adding a little pseudo-depth to your images. This needn't be anything as obvious as the 3D text presented here: just a little highlighting can turn an otherwise bland texture into something far more interesting, or make your objects stand out from the background. As usual, the best way to find out what can be done with them is simply to experiment.



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



I use the Chromebook extensively at my job. I work as a research coordinator for a medical university. My job requires the skills of a project manager while maintaining a scientist profile. I write research protocols, coordinate online conference meetings, proctor teaching labs, and process data. These work tasks are completed using apps and extensions. The paragraphs below illustrate the programs that I use in my career. These are all available from the Chrome Web Store. These apps and extensions will work on the Chrome or Chromium browser if you do not use a Chromebook.

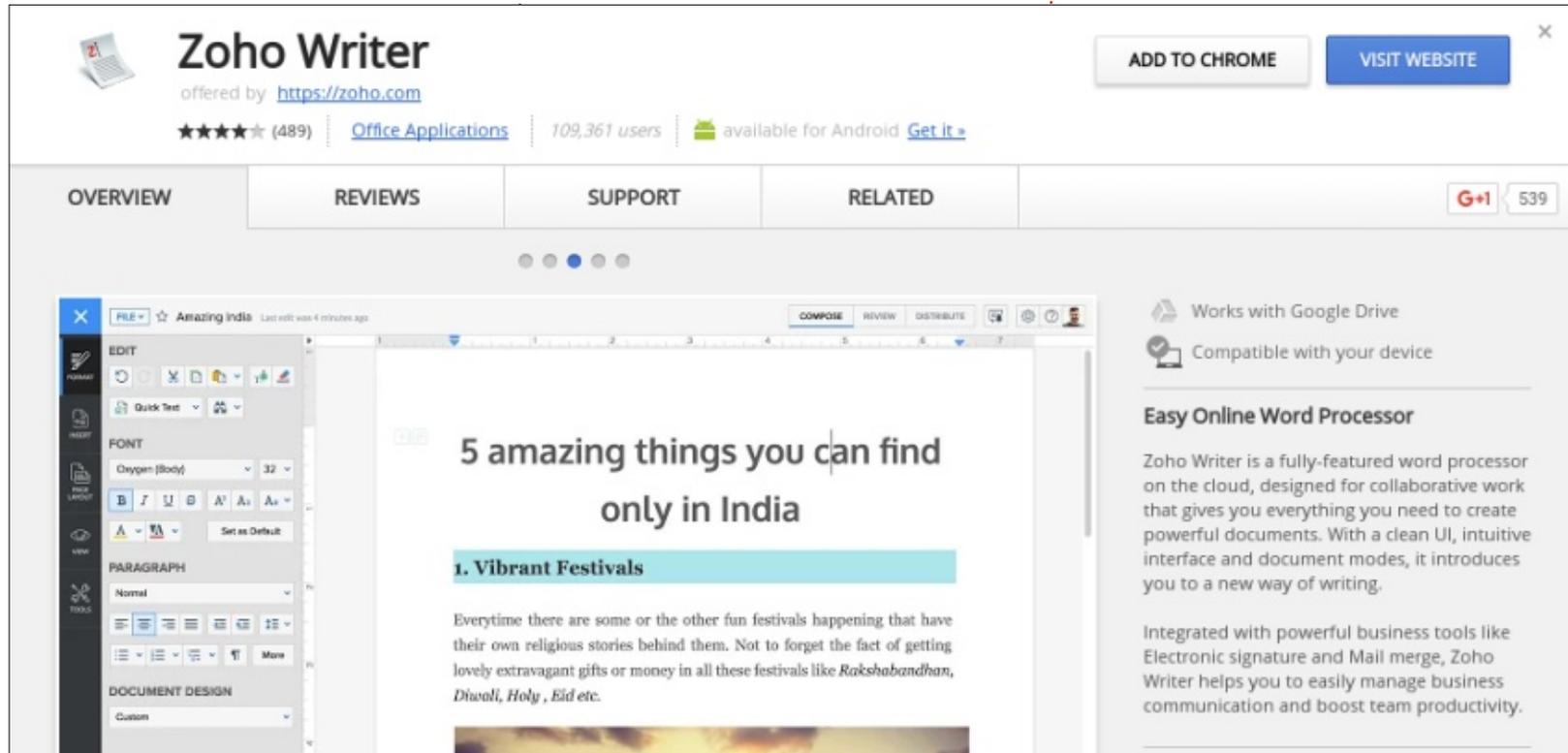
A robust word processor is Zoho Writer. It offers the basic Google Doc elements – but with some more advanced features – in one app. Google Docs minimalism can be expanded with apps or extensions, however I prefer all features to be in one app: Zoho. Zoho Writer offers a thesaurus and personal dictionary. The personal dictionary is helpful since Google Docs fails to recognize anatomical terms like acromion processes or

inferior lateral angle of the sacrum. Your finished work can be saved to the Zoho Cloud or Google Drive. Zoho does require an account, and does not function offline adequately. Zoho offers an online version of Google Sheets and Google Slides. I have no experience with these two Zoho apps. Zoho can sync among your smartphone, laptop, and tablet. The company offers a Zoho Docs for Linux option, if you would like

to have an alternative to Google Docs. Alternatively, LibreOffice is available by Rollap, however it requires a monthly subscription.

Google Hangouts offers cloud-phone capability and video conferencing. The cloud phone capability is spot on and works well. However the video conferencing aspect is not perfect. Hangouts typically has pixelated images, electronic static, and other

issues. I find Zoom is a better option, the audio and visual image is reliable and crisp. Zoom has screenshare like Hangouts, but it allows for conference recording. The conference recording is saved to a mp4 format. I frequently use Zoom to make instructional videos as a solo meeting. The two apps I use for this are Zoom Scheduler and Zoom. The Zoom Scheduler automatically ties into Google Calendar when scheduling



meetings. My jobsite provides a Zoom Professional account, and there is a chance the free Zoom account may not incorporate the above features.

Frequently, I edit videos for class lectures, training, or data collections. There are no free online video editors. Wevideo offers an online video editor, but it requires a yearly subscription. Most of the video editors focus on Youtube Videos. I also use Pixlr for photo editing. I reviewed that app last month.

PDFs are frequently used at my jobsite. I use Lumin PDF to view this document type. Like Zoho, it requires a personal account. This app opens a vast majority of PDFs correctly. Lumin does interact with Google Drive. All of your opened PDFs are accessible on the Lumin Cloud too. There are times I need an electronic signature. I use Adobe Sign, I have to disable my ad blockers for effective use.

PandaDocs is a bit more geared towards business sales professionals. These contracts require electronic signatures. I have yet to use this app. Occasionally medical device

companies or pharmaceuticals partner with medical colleges and hospitals for pilot studies. I have it installed only in case I become assigned to a pilot study. PandaDocs has a number of templates for individual use.

The most vital app I use is the Encrypt.ion app. I use this tool to encrypt files. Frequently I have to protect my research participants or students personal information. I use this app as a temporary encryption tool, until I can use a more robust program like Veracrypt. I am mandated by my job to protect a person's privacy at all costs. This app was reviewed previously.

The final app that I use is the IPP/CUPS. This replaces the Google Cloud Print functionality. Google Cloud Print works well enough, however it can be difficult to connect to new computers. The IPP/CUPS allows me to use another department's printer if I can access the printer's ip address.



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.



GUIDELINES

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

RULES

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

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

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

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

document.

• Images should be JPG, no wider than 800 pixels, and use low compression.

• Do not use tables or any type of **bold** or *italic* formatting.

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

When you are ready to submit your article please email it to: articles@fullcirclemagazine.org

TRANSLATIONS

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

REVIEWS

GAMES/APPLICATIONS

When reviewing games/applications please state clearly:

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

HARDWARE

When reviewing hardware please state clearly:

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

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





I've mentioned Computer Recycling in previous articles for Full Circle Magazine and talked a bit about some of our processes, but I've never really given a glimpse into what it's actually like at the project. The Working Centre is something of an octopus, the main body helps provide employment counselling, but there are a lot of different tentacle projects. Computer Recycling is one of the many projects that include: a used furniture and housewares store called Worth A Second Look, the Green Door, a used clothing shop, Recycled

Cycles, a bike refurbishing and repair shop, Maurita's Kitchen (a kitchen where volunteers can learn to cook vegetarian food), the Queen Street Commons, a cafe that sells vegetarian food, the Hacienda Sarria community market garden, and the Commons Studio (a space for amateur filmmakers to work on movies). One of the common factors for each of these spaces is that they tend to be overseen by one or two individuals, but it's the volunteers that often help shape the direction.

Computer Recycling started out

more than 20 years ago when an individual who couldn't work decided that he wanted to help others who were trying to get work. The individual cobbled together a handful of computers that were sitting unused, added some software, and made them available to people of the community. For several years, the project went on like this with volunteers and staff coming and going. Initially the project was very small, occupying part of a basement. It grew to include part of the second floor of the same building and expanded to being

open to the public two days a week, one for repair and one for sales.

It was around this time, late 2001, that I learned about the project - accidentally. For a couple of years I'd been attending the Kitchener Waterloo UNIX User's group - a group made up of UNIX professionals. Most of the group had years of experience with UNIX and UNIX-like operating systems in the industry. By comparison, I was just a hobbyist and felt a bit out of place, so I posted a message in a local USENET group (back when



people actually read USENET) asking if people were interested in starting a Linux User Group. One of the responses I got back was from Bill Rieck, who, along with a handful of other people, had started a Linux User Group called the Kitchener Waterloo Linux User Group - <http://www.kwlug.org/>.

As it turned out, KWLUG was hosted by Bill at The Working Centre. At my first meeting, I heard one individual, Paul Nijjar, talk about how he was working on a Linux distribution for The Working Centre's Computer Recycling Project. I joined Paul's project helping figure out how to get PS/2 mouse support (serial was easy back then, but we needed to do a bit of trickery to get PS/2 support working with our Debian 2.2 kernel). Our goal for the distribution was to create a desktop environment that would work on a 486 with (initially 8MB) 16MB of RAM and a 400MB Hard Drive. We accomplished that, but were a small group of volunteers: Paul, Daniel Allen, myself and R.K. Ammann - a volunteer we never met but who ended up being a huge help designing our web presence: <http://wclp.sf.net/>.

For some crazy reason The Working Centre decided to take me on to run the Computer Recycling Project in late 2005. Bill moved to System Administration, and Paul was ever present as a volunteer in both Recycled Cycles and Computer Recycling. A couple of years later, Bill started his own consulting firm, and Paul was hired as a System Administrator. In 2005 The Working Centre was largely a "Windows Shop." Much of our infrastructure was driven by Windows Servers (it still is to an extent) but I was quite fond of Linux.

One of the directions we wanted to head towards with Computer Recycling was a more full-time operation. In order to do this, we needed a better space and the infrastructure to support a more active project. Although the space on the second floor was perfect because it was bright and sunny (and we nerds could all use a bit more sunlight), I (and I expect many volunteers) never enjoyed sales day because we were often faced with carrying 22" CRT monitors that had lead shielding up 3 long flights of stairs from the

basement to the floor, all the while avoiding bicycles (Recycled Cycles was hosted in the space across from us at the time). We found that space in the basement of a new building, 66 Queen Street, just across the street and down a couple of doors. And we found a part of that infrastructure in open source software.

Computer Recycling already had a SAMBA server that was being used as a file server for cloning computers. We also had an NFS server Paul had set up to serve Linux up for Linux installs. What we didn't have was a point-of-sale. Being mostly a Windows shop, we looked at Microsoft Dynamics. We were starting to look at Sharepoint for other things and Microsoft Dynamics looked like it might fit in, but it was (at the time) lacking support for Canadian taxes. We also needed some reporting that was simply easier to do with open source tools. Cost was a factor, but ultimately we decided open source would suit our needs better because anyone could maintain it and make changes. I had some experience using OSCommerce, an open source eCommerce suite, but I had only a smattering of PHP and MySQL experience (enough to set



up OSCommerce and fill it out with stock), so we decided to hire someone to help create a Point-Of-Sale front end on top of OSCommerce.

The Working Centre already had a skilled programmer, Paul Harvey, but much of Paul's time was divided among a number of other projects. Paul and I worked closely together laying out the framework for what the point-of-sale would look like. Paul created all the graphics and helped with a good amount of the PHP code, but we also hired a programmer, Tim, to help finish the point-of-sale in a short time. Linux at The Working Centre was very much an under-the-radar effort. While Computer Recycling was putting out machines with WCLP Linux installed, it wasn't until Ubuntu 6.06 that we started to look at it in a larger way.

I had used Ubuntu since version 4.10 Warty Warthog, and used it at the project to create signs using Inkscape and GIMP. It looked good and provided simple driver support that volunteers could easily learn to implement. But I waited until Ubuntu 6.06 to change from WCLP to Ubuntu. WCLP had suited our

needs initially, but, as we got more powerful machines and as Ubuntu matured, it was clear that our project simply couldn't keep up given our schedules. Even though Computer Recycling was by-appointment-only at that time (early 2006 to mid-2007), everyone in the I.T. Group had several responsibilities.

In August 2007, Computer Recycling opened "full time" with the initial hours of Tuesday to Friday 10am to 6pm and Saturday 10am to 4pm. In 2009 we changed the hours to Tuesday to Friday from 10am to 5pm. Saturday was cut to allow me to come in

Mondays and take care of administrative work and participate more in the normal I.T. work that goes on at The Working Centre.

The main entrance to Computer Recycling is off the side of the 66 Queen Street South building. The official address for The Working Centre is 58 Queen Street South, that address and 66 Queen are joined together and the 66 building is on the corner of two streets, Queen and Charles Street. The Charles Street entrance has no official number, but it's the simplest way to get to the project and the shortest path to bring in or

take out equipment.

Over the years, we've seen a lot of equipment come and go. When The Working Centre first purchased the 66 Queen Street building, the project got a donation of 80 x Pentium Pro-based computers. What made those computers particularly interesting (and still does) was the large amount of gold on the CPUs. We've seen Commodore 64's, Commodore Vic 20's, even a couple of Commodore Amiga's over the years. While most donors tend to donate PCs, we've also seen a smattering of UNIX machines including a few Sun Microsystem-based machines and an SGI O2 in mint condition with the original SGI carrying case. It's rare for the project to see Apple-based computers, but they do get donated and refurbished from time to time (we just finished refurbishing a recently donated 2007-era Mac Mini).

When you first walk into Computer Recycling, depending on the time of the month, you may or may not see a pile of boxes, system units, printers, scanners, and other devices. These devices are the project's ewaste. While we prefer



to refurbish items instead of recycling them, the realities of the Internet make this difficult - Pentium III's and Pentium IV's can't handle 1080p video and tend to stutter on streaming 720p video. We get the odd request for older items, but even these are becoming more scarce. In 2009 we joined the Ontario Electronic Stewardship (OES) as a computer refurbisher. As part of the OES, our electronic waste goes from our facility to a large fenced off primary processor who provides end-of-life processing of equipment. These are the folks with giant shredding machines that can shred an entire computer into pieces. Besides helping us process things that Computer Recycling doesn't focus on, the primary processor helps us fund Computer Recycling by providing the project with a bit of money for the electronic waste.

A little beyond the ewaste is a door that leads into the main volunteer work area. The main area has 9 computers set up, all but 2 of which are Xubuntu Linux computers. Even though Computer Recycling is a Microsoft Registered Refurbisher, I chose to stick with Linux for most of our workstations

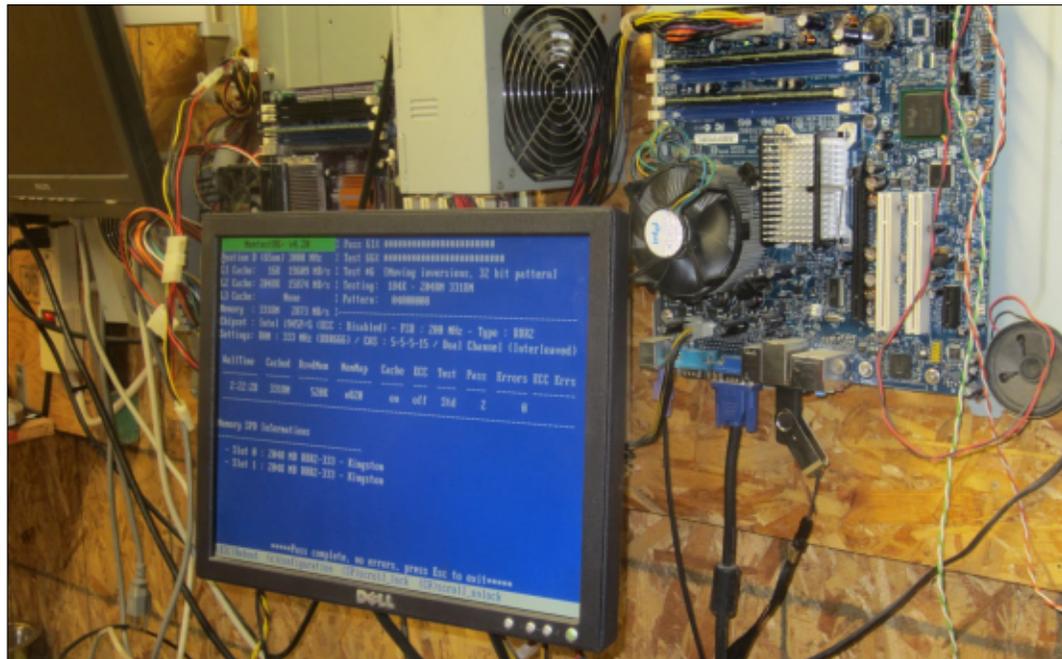
to help expose volunteers to Linux and cut down on the amount of administration we might have to do due to viruses and malware. Each workstation is on a KVM switch (keyboard, video, monitor) so that volunteers can work on a computer on top of the desk and switch to the computer below for support. On the back wall we have a similar setup for 4 monitors except each KVM switch can handle up to 4 computers - allowing us to ultimately set up 16 computers at once on the back and 8 in the middle (the 9th machine isn't on a KVM switch). This setup caused us several power problems as we started to build more

machines at once and required us to call in electricians to add more outlets on more electrical circuits.

The other side of the wall, back in the room where the ewaste is stored, there's another shelf for small ewaste items: fans, heat sinks, expansion cards, motherboards, non-motherboard/expansion circuit boards, cables, RAM, and other assorted items. Once one of the labelled buckets on this wall is full, a volunteer transfers the contents to a box and labels the box. The waste is then added to the ewaste pile closer to the shop entrance.

Across from the small item ewaste wall is a workbench that's used for a number of functions: memory testing, soldering, and cleaning computers. Three motherboards are screwed into the wall. We boot Memtest86+ from USB key on each of these boards to test RAM covering SD-RAM, DDR, DDR2 and DDR3. On the odd occasion we get RAMBUS RIMM RAM we usually test the RAM in the machine the RAM originally came in. This is also the case for "Registered" and "ECC" RAM.

Earlier, I mentioned that while staff oversee projects, volunteers tend to help shape projects. One of the ways this happens is with the services the project offers. Volunteers tend to bring a lot of different skills beyond computer knowledge to the project. In Computer Recycling, I first started noticing this when communicating with a couple of volunteers from Colombia who spoke a small amount of English. It turned out that one of the volunteers had a lot of experience fixing industrial printers and copiers - it had been his business in his home country. He taught the other Colombian volunteer who spoke a bit more



English, who taught another volunteer who was interested in printer repair. Over the years this has happened time and time again where volunteers bring skills like soldering, shipping and receiving, programming, and cabling to the project. Some areas, like the soldering/memory testing area, have changed based on skills volunteers have brought to the table.

Back on the other side of the wall where the main volunteer area is, there's several shelves for parts. On the shelves are boxes with parts that range from video cards to hard drives and processors. Everything is open to the public to browse through though not everything is labelled with a price simply because with thousands of items we simply don't have enough volunteers to do it all. We could store the items in a storage area, but then they'd sit for a long time. We decided it was better to have items visible than to hoard things in a back room.

Just up from this area is a small storage area consisting of 3 shelves to hold computers volunteers have started building,

but haven't quite finished. When volunteers build a computer they work from a checklist of steps. This checklist has undergone many iterations over the years as our infrastructure has changed. At one time we did almost everything from CD or floppy disk. This was particularly unwieldy as we used a lot of different tools and needed a lot of disks and discs. Both floppies and CDs tended to get left in computers even though checking the drives was a step on the checklist. Accordingly, we added quality assurance to the checklist and made it mandatory that the volunteer building the computer was not the volunteer providing

the quality assurance.

The "sales" area is a bit beyond the "on hold area" and is divided with Linux-based computers on the left-hand-side of the shelves and Windows-based computers on the right-hand-side. There are approximately 80 steps on our checklist to build a Windows-based computer, building a Linux computer consists of about 15 fewer steps (mostly due to licensing steps). Computer Recycling focuses on building desktop computers, and what you'll see on these shelves are mostly desktop computers, LCD monitors, and the odd Laser

printer.

Almost opposite the "sales" area is a small glass table on which our Linux laptops sit. Approximately once a month, always on a Saturday, we invite volunteers into the space to help refurbish laptops. Because the laptops tend to be older individual donations, and because the project relies entirely on donations for computers and parts, we don't offer any warranty on the laptops. As such, we never install Windows on laptops since one of the requirements is offering a warranty. While we do test the laptops (and anyone can try them in the shop), once they're sold they're all yours. Given this, we've adjusted the prices of laptops accordingly. In the past two years we've sold notebooks ranging from \$40 to \$125 (for a Core i7 that was in terrific condition). Demand far outweighs donations so we frequently go for stretches where we don't have laptops available. Sales of desktop PCs still make up the bulk of income for Computer Recycling and help offset the operating costs and licensing fees for the Windows desktops.



At the very back of the shop lies our storage area. The storage area consists of several rows of shelves for approximately 30 feet and on 4 different walls. At capacity, we can store around 600 computers, however half of this space is shared with The Working Centre I.T. team so they can maintain the computers in use at the resource centre and in the other projects. All told there are approximately 120 computers in use at different parts of The Working Centre.

It's in this area that we also store rackmount servers. The Working Centre uses rackmount server hardware for some of its computer infrastructure, but some of the rackmount servers are just machines the Computer Recycling project hasn't processed yet. Rackmount servers, particularly the single-core or dual-core generation we've tended to get in the past, don't seem to attract the kind of attention we once used to get for them. As such, they tend to sit until we get to them or end up sending them to our primary processor.

Computer Recycling is always looking for volunteers, particularly volunteers with knowledge of

older systems. Linux expertise is an extra plus as we now use a number of systems, including a PXE-boot server for all our installations and tools (we kept losing CDs and floppies in systems). Our current longest-serving volunteer is only 26 and has been a volunteer with the project for 8 years. Volunteers range in age from 16 to well into their 60's, but we've had both younger and older volunteers. Most volunteers are men, but we've had periods where women outnumbered men.

We're also always looking for hardware donations, particularly anything of Core 2 Duo or newer

vintage. As a community-oriented refurbisher, we tend to receive a mix of donations, about 50% from businesses and 50% from individuals. Business donations are fewer, but tend to be larger. Individual donations are sometimes quite surprising and have included UNIX-like systems, older systems that were once top-of-the line gaming systems, and non-mainstream systems.

For more information about The Working Centre's Computer Recycling Project, check out the website at: <http://www.theworkingcentre.org/cr/>, or contact Charles (me) via

email: cr@theworkingcentre.org. You can also message me on Twitter or G+ by sending a message to: Chaslinux.



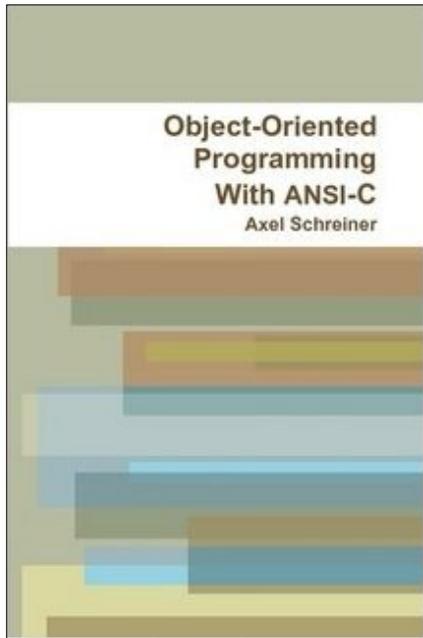
Charles is the author of Instant XBMC, and the project manager of a not-for-profit computer reuse project. When not building PCs, removing malware, and encouraging people to use GNU/Linux, Charles works on reinventing his blog at <http://www.charlesmccolm.com/>.



UBUNTU DEVICES

Written by Ronnie Tucker

Sorry, nothing to report this month as OTA-14 is slightly delayed. Hopefully you'll have it just after this issue is released.



Object Oriented Programming with ANSI-C

by Axel-Tobias Schreiner

There is something about C that many of us can't let go of it. With the advent of programming languages such as Python and Java, many others have started to wonder, is C worth learning? Or, more importantly, is C as powerful as these relatively new languages?

When I tried to break down what power actually meant, I stumbled upon things such as a

standard template library, portability, etc, but the one that really caught my attention was object orientation. I thought it would be impossible to implement things such as inheritance and class level abstractions in a language like C, but then I came across this book called "OOC".

I have never, ever read a book like this one. What makes it special is that instead of throwing the class-like syntax at you, it dwells deep into the concept of abstraction. For the first time in my life, I was able to feel polymorphism taking over my code, and dynamic linkage creating a beautiful artwork of run-time resolutions. For those of you who don't know what that means, and have already had experience with an object oriented language, it's time you step back and wonder "do you really know how your code is working?"

What makes the book great altogether is that it is freely available. You can get a copy from <https://www.cs.rit.edu/~ats/books>

[/ooc.pdf](#), and start exploring the real power of C. Also the book spans just 221 pages.

Before reading this book, projects with large numbers of files would scare me. If the file count went anywhere above five or six, I found myself perplexed by the complex distribution of work into modules. But now, I am working on projects with a minimum of 25 files. I understand it all now. The book often demarcates a conceptual topic into its 'type, api, and implementation' which makes working on big projects really easy. Once you learn to work with multiple files, it becomes easier to read code that others write because they would often do the same.

The other specialty of this book is that every second or third chapter in the book is a fully fledged example of an application built using the concepts learned in the previous chapters. Dedicating an entire chapter to an example helps to explore it in detail. At the end of such chapters, one can

expect to find exercise questions which build upon the application being worked on.

At the end, the book also provides hints on awk programming - a pattern scanning and processing language.



Table of contents is as follows:

- Abstract Data Types — Information Hiding
- Dynamic Linkage — Generic Functions
- Programming Savvy — Arithmetic Expressions
- Inheritance — Code Reuse and Refinement
- Programming Savvy — Symbol Table
- Class Hierarchy — Maintainability
- The ooc Preprocessor — Enforcing a Coding Standard
- Dynamic Type Checking — Defensive Programming
- Static Construction — Self-Organization
- Delegates — Callback Functions
- Class Methods — Plugging Memory Leaks
- Persistent Objects — Storing and Loading Data Structures
- Exceptions — Disciplined Error Recovery
- Forwarding Messages — A GUI Calculator





In 2006, I published my first website using Dreamweaver, the top software at that time. I was using Windows, which cost me about \$105, MS Office which was a bit dearer, and Dreamweaver which cost about \$115, and then a course on how to use Dreamweaver which cost about the same. So let's just do the Maths here:

Windows XP.....	\$105.00	AUD
MS Office.....	\$175.00	AUD
Dreamweaver 8..	\$115.00	AUD
Using Dreamweaver 8 (course)		
.....	\$ 110.00	AUD
Total.....	\$ 565.00	AUD

Just for the record, I started with Adobe Creative Suite at \$1500. The switch to Dreamweaver was a saving, I thought!

Today, in 2016, I run 6 websites on my own and service several others. Here's my software costs:

Ubuntu 16.04 LTS.....	Free
LibreOffice.....	Free
Blueshell.....	Free
Total.....	\$ 0.00

So why do so many people still pay a fortune for software?

Being posted to New Zealand from Melbourne Australia, my stuff was in storage back in Melbourne. I needed to print some forms out and going to the library was not only a pain, but in a month, I'd have paid the equivalent to the purchase price of a new printer!

In a fit of insanity, I went to Harvey Normans here in Christchurch, only because he had a huge clearance sale. Typical for Harvey Norman, I ended up buying a printer at the bargain discounted price that every other retailer would have charged anyway. But, I didn't say I was a genius!

I had grown so used to everything working in Linux now, that I didn't bother to check, and had the regrettable misfortune to buy a Brother all-in-one printer (Model MFC J480DW). I set it up and it won't work in Linux – no Linux drivers and it hates CUPS (the Linux generic printer software). Because I teach IT, I have to have a copy of Windows, so I am able to use it in Windows, but I can see why, in some cases, Linux

just won't cut it. However, that still doesn't explain why so many people haven't switched. My Epson and HP all-in-one printers all worked perfectly in Linux.

When I started my website, Mimenta.com, the stats said that 80% of all my viewers used Windows. Only 0.5% used Linux and that was in 2006.

Today in 2016, 56% of my viewers use Windows and 20% are using Linux. On the surface, that seems great progress but it tells me that there's a vast number of poor folks out there who are in the dark and are paying big money for their ignorance.

I started asking around to see why people were still shelling out for software they could get for free. The most common response was that I must be some kind of supergeek to understand Linux. They visualised Linux as the old command-line interface. Today you can do everything in the graphics interface. You don't need the command-line any more.

However we still have a few hurdles:

- Old ideas of Linux being command-line rather than icons and graphics persist.
- Some people see Linux as the tool of hackers and the dark web.
- Browser functionality – Firefox is rejected by many online games because it has an out-of-date flash player. Chromium is in the same category.
- Some hardware does not communicate with Linux, however these are in the minority now.

Maybe it's time we put together a new list of incompatible hardware (routers, printers, scanners, cameras, etc), and sent copies to those manufacturers. We have enough market share now to start pressuring some of these manufacturers. No business can afford to reject 20% of the market.

Full Circle Magazine could be the perfect rally point to collect comments, perhaps run petitions to drive these changes. It's time Linux became the dominant operating system.





SFTP CORRECTION

The statement (FCM#113) that SFTP is not secure is incorrect. The blurb about it working only between Linux machines is also incorrect: Macs and Windows work as well, as do Android Phones (ES File Explorer). It is incorrect to state that this is only suitable for local intranet connections: SSH/SFTP was designed for secure use over unsecured (public) connections.

Also, you can connect _from_ Windows easily using WinSCP (Windows) or Filezilla (Linux, Mac, Windows). Connecting from a Linux to a Windows machine using SSH/SFTP is more difficult, but doable (using sshd in cygwin, or a commercial sshd server).

Kevin O. Grover

SYSTEM76 CUSTOMER

In response to last month's Full Circle System76 article. I am responding because I use a System76 Lemur5 laptop computer.. When I bought it, I opted for the 240GB SSD. I am getting great battery life (8 to 9 hours) even with the WiFi on. I added an 8GB memory strip for a total of 12GB. I have had few problems with it. and. in most every case. the System76 technicians and I worked out the problems. As of this time. the laptop is working great. Good WiFi connectability, Bluetooth has finally settled down. and now all my BT devices pair/connect quickly, especially my BT speakers. My unit has an optical drive which I find invaluable. I see that the newer Lemur does not have an optical drive, which is a loss, as I often play DVD's or CD's, and I use it to rip my CD's to make ogg files for my music players – some call them MP3 players. I find my Lemur to be a good traveling computer with a good balance in size and operability. It gets about 2.5 times

the battery life of my Acer One 10" Netbook (3+ hours). I currently have Ubuntu 16.04 LTS installed, and, most likely, will wait for the next LTS version. The SSD is great as it boots up quickly and does not use as much power as a HDD.

John Hart

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ubuntuforums.org/forumdisplay.php?f=270

FULL CIRCLE NEEDS You!



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

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

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



Some time ago, while browsing Youtube for videos on LCD monitor and television repair, I came across Dave Jones' Electronics Engineering Video Blog (EEVBlog). At the time of this writing, Dave has put up close to 1000 electronics-related Youtube videos. Unlike a lot of videos that concentrate on today's technology, Dave covers a wide range of electronics. Dave's "Mailbag" and "Teardown Tuesday" are among his more popular videos.

In stereotypical Aussie fashion, Dave wields a huge hunting knife to open packages in his Mailbag videos. He's also quite colorful with his use of language and sometimes downright insulting, but he "calls things as he sees them." When tearing apart a product that doesn't live up to its claims, the word Bull**it often comes up. Despite his brash behaviour, there's value in checking out Dave's blogs, episodes like #75 Digital Multimeter Buying Guide for Beginners, and the more recent #943 How EEVBlog Does Video

editing, are worth checking out.

EEVBlog can be found through the built-in KODI Youtube plugin, but there's also a built-in EEVBlog Video add-on that's a part of the normal KODI repository. If you're interested in how electronic products are designed, this is a

good channel to check out. Guest stars include Dave's son, product engineers, and one of the oldest engineers in the world.

Continuing the theme of brashness if you're into music, and metal in particular, you'll want to check out the MetalVideo add-on.

MetalVideo takes its content from metalvideo.com, but provides it in a more organized fashion. You can watch what's being watched right now by others, the most recent video added, the top 50 ranked videos on the site, a random selection of videos, the video voted 'video of the day', or search



for a particular video. I like addons like MetalVideo because they remind me of content I used to like but haven't listened to in a while. Install the MetalVideo addon as you would other video addons by clicking: Videos > Addons > Get More, then scrolling down to the MetalVideo addon, clicking on it, and clicking Install.

Before you start searching MetalVideo, you might want to check out your remote control. Depending on your KODI setup, you might be able to do more with your remote. This tip isn't universal for every remote, but for remotes with numeric keys that also have letters you can press the number several times to get the letter you

want. For example: over the number 2 on our pictured remote, if you press 2 once you get 2, twice you get the letter a, three times you get the letter b, four times you get the letter c. Keep pressing for capital letters. This trick doesn't work for remotes that don't have numeric buttons, and sadly it didn't work on the remote included with our Zoomtak T8H KODI box despite the fact that the remote has numeric keys and has letters labelled for each numeric key.

Lastly, if you're looking for a simple way to get a "Windows remote" working with KODI on Ubuntu Linux, just install the lirc package:

```
sudo apt install lirc
```

When prompted to choose a remote, scroll down and select Windows Media Center Transceivers/Remotes (all) or pick the remote you're using if it's not a "Windows Media Center" remote. Windows Media Center remotes can be found inexpensively all over ebay (just make sure to also get the infrared receiver as part of the package). When prompted to choose an IR transmitter, you can just choose None unless you're using a cable box or dish receiver.



Charles is the author of Instant XBMC, and the project manager of a not-for-profit computer reuse project. When not building PCs, removing malware, and encouraging people to use GNU/Linux, Charles works on reinventing his blog at <http://www.charlesmccolm.com/>.





Q&A

Compiled by Gord Campbell

If you have a Linux question, email it to: 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 am struggling to install Ubuntu on the volume I want. The volume is the result of shrinking my secondary drive on my Windows 10 installation. I have attached pictures of both the Windows Computer Management screen, and my options when trying to install Ubuntu.

A (Thanks to *Impadivus* in the Ubuntu Forums) The Computer Management screen shows that the secondary drive is formatted as a "Dynamic Disk". Ubuntu can't handle Windows dynamic partitions. You have to get rid of that dynamic partition first to get back to basic partitions, then Ubuntu can create an ext4 partition for itself.

Converting a dynamic partition back to basic requires deleting the partition, so that means backing up your 416GB of data and formatting the entire drive.

Q Is there an audio player available that can be launched from the command line, run in the

background, and controlled via software signals from another process? This would be to do basic functions like play the next or previous file in a playlist.

A This doesn't answer your question, it's an alternative approach.

I bought a used HP 5189 keyboard for \$4, and it has a complete set of playback control keys. Audacious and VLC respond to those keys, even when they are in the background.

Q I am trying to install Ubuntu 16.04 LTS on my home desktop. I created a Live USB stick (formatted in FAT32), changed the boot priority to USB, but the computer just won't progress with booting from it. There is no boot logo or text nor any error messages.

A (Thanks to *Geoffrey_Arndt* in the Ubuntu Forums) Use a better usb flash-stick tool such as etcher: <https://etcher.io/>

(And it solved the problem!)

Q My dad and I use PyChess and sometimes when we cannot finish a good game, we try to use the save feature. We both save the .pgn game files that are created, but, when we try to load these games later, it seems as if only one person is able to view the board as it was saved.

A (Thanks to *oldrocker99* in the Ubuntu Forums) This is a reported bug. The fix appears to be to download PyChess 12.4 from the PyChess download page.

Q I have an old Samsung Galaxy Tab 2 and I would like to install Ubuntu.

A (Thanks to *wlbi* in the Ubuntu Forums) A simple answer: You can't just do this.

Most of the smartphones and tablets are not using i368 or amd64 CPUs, they use an ARM CPU. ARM CPUs don't have a PCI

bus for hardware detection. This means each device needs its own special-build operating system, fitting exactly to the specific hardware.

There is not only one Galaxy Tab 2, there are several different models, such as p3110, p3100, p5110.

Here you can see, that already somebody started to do that work: <https://wiki.ubuntu.com/Touch/Devi>. But it was discontinued in 2013, because it is a huge job!

TOP QUESTIONS AT ASKUBUNTU

If you are nervous about clicking on a short goo.gl URL, you can get information about it quite easily. Copy the URL, paste it into your browser's address bar, and add a plus-sign. Now goo.gl will tell you where it goes, as well as statistics about its use. (Thanks to askleo.com for the tip.)



In issue 113, the third entry in this section was incorrect. "Do file-extensions have any purpose (for the operating system)?" should have been <https://goo.gl/n9gxsR>

* Command-line snake game?
<https://goo.gl/O2Ul4Q>

* How to make files protected?
<https://goo.gl/No0srJ>

* How is being able to break into any Linux machine through grub2 secure?
<https://goo.gl/GMITMv>

* Where is the kernel documentation?
<https://goo.gl/BeRbba>

* How do I install the latest OpenOffice?
<https://goo.gl/xLZRZP>

* How do you copy a directory and its contents to a new location under a new directory name?
<https://goo.gl/CXIUm0>

* Making a large file using the terminal
<https://goo.gl/1SO7Mu>

* What do ^\$ and ^# mean?
<https://goo.gl/f2mbNa>

* What is the text to the left of a command (as typed in a terminal) called?
<https://goo.gl/aqzqMZ>

TIPS AND TECHNIQUES

Backup, anyone?

If you don't have backup, you will be very sad the day your hard drive fails.

You will also be very sad on the day you accidentally, permanently delete 10 years worth of pictures.

Backup has two components, hardware and software. Hardware might include DVD-Rs (if you don't have a lot of data), a large flash drive, an external hard drive, another computer on your network, a Network Attached Storage (NAS) device, or a system on the Internet, such as Dropbox. Backup hardware is not inside the box of the computer you need to back up.

If you use an attached device such as an external drive, my suggestion is to have at least two of them, so at least one is physically removed at any given time. Store it in "a safe place," such as your friend's basement, so fire or theft will not take every copy of your valuable data. Swap the drives from time to time, such as once a month.

Backup to the Internet is a special case. My feeling is that it's not relevant to an individual if you need to backup more than 10 GB of files, your Internet connection just isn't fast enough. There are a few major free options, including Dropbox, Google Drive and Microsoft Onedrive. They are all "small," but you can pay for more online space. Dropbox has an advantage in Linux, in that you install the Dropbox client software, then just copy files into your local Dropbox folder and everything happens automatically from there. For the other two, you have to use your browser to manually copy files to the online storage, at Internet speed.

There are several software options for backing up in Linux, with Rsync perhaps the most

popular, invoked as a scheduled job in Cron. Once you set it up, the theory is that you don't have to think about it, it just happens. Well, except for swapping the backup media.

There's a GUI for Rsync, Grsync, which means you can do a manual backup from a graphical interface.

What have I done about backup?

I have a dreadful NAS box which was declared too slow and unreliable for use at my office. A couple of years ago, I did a full copy of my home folder to it.

I use Dropbox for small work-in-progress files.

For one static set of files, I burned them to DVD discs. It costs about \$15 to back up 200 GB of data on DVD, which is much less than an external drive of that capacity.

Some of my work is automatically backed up on the Internet, such as the Q&A column, which is saved on the fullcirclemagazine web site. Likewise with any web sites I work

on: the online version is live, and the files on my computer are the backup.

I recently began running Linux from an SSD, with my old hard drive still used for media files. I set up an old netbook as a file server, and installed Crashplan to do regular backup of my new home folder to the netbook. In this configuration, Crashplan is free. The advantage of the netbook is that it hardly adds anything to my electricity bill.

At the (Windows-centric) office, it's a different story. The big fear is that the office goes up in flames, or has some other physical catastrophe.

I set up a backup machine running Xubuntu. Users are told to save all their data on the main server, and that gets backed up over the network every night. Once a month, the drive holding the server backup is swapped out and taken off-site. Eventually, the drive goes to long-term storage. If required, I could restore a file which was deleted three years ago!

The users' workstations are also backed up, not because of the

data, but because of the configuration. The typical workstation has hundreds of programs installed and configured. Most users also have programs installed to deal with specific clients, and it would take ages to get them up and running from scratch if a hard drive failed. In most cases, the backups are done weekly, since not much changes from day to day.

We also take an off-site copy of the workstation backups on a monthly basis.

Most recently, we added daily online backup of the most important parts of the server.

If the office burned, it would take some work to get the company running again, but we believe IT would be the least of the problems.



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.



What do you get when you mix high speed vehicles with football? You get Rocket League, a very interesting idea for a sport that may some day be a reality – but for now is a fast-paced video game. Rocket League is self described on their website as a futuristic Sports-Action video game where soccer meets driving. It's built a pretty impressive online competitive following since being released on Microsoft Windows and PlayStation 4 in July 2015. Developed and published by Psyonix, Rocket League was later also released for OS X, Linux and Xbox One in 2016.

The game can be single-player or it can also be multi-player with up to 8 players at a time. The multi-player mode can be local or online. If played locally, the game can be split in either 2, 3 or 4-player split-screen mode. Not an original concept, it's in fact the sequel to Supersonic Acrobatic Rocket-Powered Battle-Cars which was released in 2008 for PlayStation 3 and, although not a huge success, it gained enough of a loyal

following that fueled enough momentum to deliver its sequel, Rocket League.

Rocket League sells on Steam for around \$19.99, or you can go to the Rocket League Store to buy it and download it – but this will then redirect you back to Steam, so you may as well just go there first. I originally got Rocket League for free when I purchased my Steam Controller, but had to wait until its Linux release to play it.

I've been playing the game mostly with an Xbox 360 game-pad

controller and have enjoyed it immensely. Playing this game is fairly easy and, though a training tutorial is included for anyone interested, it's not necessary to go through it unless you want to learn some of the more complex moves that you see other people making. The game consists of two teams, with up to four players each, battling it out in an arena that roughly resembles a football stadium. Players drive cars and must work as a team to hit the ball into the opposing team's net. Anyone who's ever played football (or soccer, as one country calls it)

will be familiar with Rocket League. Living in the USA, where soccer is not as popular as it is in other parts of the world, I was rather surprised to find out how popular Rocket League is among gamers.

After playing it for a couple of hours and seeing other players make moves that I didn't know how to make, I decided to check out the included training which is split between Rookie, Pro and All-Star. The Rookie Option showed me nothing I didn't already know, things such as accelerating, turning, braking and other basic moves. The Pro and All-Star portions of the tutorial showed me some interesting moves that helped my game improve tenfold by the time I'd finished the tutorial. I learned how to hit the ball sideways instead of always in front of me. I learned how to jump and hit the ball in the air. I also learned how to glide through the air after jumping a higher-than-normal distance off the ground, flipping my car and hitting the ball in mid-air. Scattered throughout the



arena are booster markers which you need to drive through to accumulate booster charges – which are activated when you press the booster button. These boosts release a cool-looking smoke from the rear exhaust while also giving you, as the name implies, a momentary speed boost. Depending on how aggressively you play, it's also possible that you completely obliterate and destroy other cars but this doesn't give you any extra points, it only slows down the other player since they'll have to re-spawn in a different area of the stadium, usually far from where the action is.

There are three modes that you can select to play from the menu screen. The choices are Online, Exhibition or Season. The Online mode sets you up with other players to play up to four vs. four in online play. Exhibition is just a single locally played game where nothing is at stake. Season is a locally played mode also, but it differs from Exhibition in that it sets you up in a season consisting of anywhere from 9 to 36 weeks and, depending on how well you play, by the end of the season there are playoffs to be played which culminate in a championship game – which will reward you with

a nice shiny trophy if you succeed in winning this championship game. It took me about a week to get through a season while playing between 20-30 minutes daily until I eventually won the championship.

I had mentioned earlier that Rocket League is a popular online game but just how popular it is will probably blow your mind. Since its release about a year ago, it has been such a huge success that it is now one of the top video games in all of E-Sports. This year, the Rocket League Championship Series has been home to competitive Rocket League matches all around the globe. The RLCS lasts about three months,

and matches are held in North America as well as Europe. The victors of the current RLCS (November/December 2016) can expect an estimated prize of \$125,000 for first place. Considering the fact that we're talking about a one-year-old game, this is pretty impressive. Already, Rocket League has become affiliated with eSports League as well as Major League Gaming which are two of the top eSports leagues in existence. The online playing experience is a true delight. You've got a few choices to make before beginning online play such as 1v1, 2v2, 3v3, 4v4 regular games, snow game, rocket labs game, hoops game (basketball

inspired), etc. If you're interested in doing more than just your average find match/play match mode, you can choose from some of the competitive options which will rank you and pair you up with others with similar ranking to yours. The ranking system needs a minimum of 10 matches to calibrate so as to get a better idea of what ranking to give you thus dictating the type of players with whom you'll be set up. I was very pleasantly surprised to discover that you need wait at most only two minutes to enter an online match and, unless involved in the competitive scene, you can join and/or drop out anytime. The response and latency from the online experience was extremely smooth and left me more than satisfied.

As far as the choice of vehicles you get to drive, the choices seem to be endless. As you play the game, you unlock new vehicles as well as decals, paint jobs, tire rims and other cosmetic items. In addition to these unlockable items, you can also purchase a ton of DLC. Some of the DLC items worth mentioning are vehicles such as the Batmobile from the Batman V Superman motion picture and the



DeLorean from Back to the Future, among others. Part of the proceeds from these purchases goes toward funding Rocket League's eSports events and their prize pools.

This game's sound and graphics are pretty much on par with most of today's sports video games with one possible exception. Since this is a fictitious sport that exists only in this video game, some of the stadiums in which you get to play are rather futuristic, extravagant and outrageous buildings. In most of these stadiums you can even drive up the walls and onto the ceiling for as long as momentum allows. Then there's the issue of the cars themselves, some of the boost activated effects that come out of the exhaust are colorfully unique and even funny. These include the flower boost smoke and the money sign green smoke that no actual car has ever actually released from emissions, not even in my peace-loving, environmentally conscious home state of California. The soundtrack that comes with the game is pretty diverse and plays its music in random mode, but you can also change the station with the push of a button.

This was most definitely a fun game to play. Lots of us in the Linux gaming community had been waiting for this game's Linux release for quite a while so we're more than delighted to finally have it added to our Linux library. Having played the game for about 6-8 weeks, I still haven't been able to find anything I don't like about it. It's got many Pros and, in my opinion, zero Cons. The Season Mode which is intended to be played locally is a good place to start and to get to know the game while you learn some more advanced moves. The graphics and sound, as already mentioned, are

quite superb. The gameplay is very responsive, even in online mode. The online mode, which as most players seem to agree, is how the game is intended to be played, runs extremely well on Linux. Finally, the entire experience on Linux makes it feel as if this game was originally intended to be released on Linux, thus I give this game a perfect rating.



MINIMUM SYSTEM REQUIREMENTS:

OS: Ubuntu 12.04 or higher
CPU: 2.4 GHz Quad Core
Memory: 2 GB RAM
HDD: 5 GB HD space
GPU: Nvidia GTX 260 or ATI 4850
Broadband Internet connection



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





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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.

<https://www.patreon.com/fullcirclemagazine>



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