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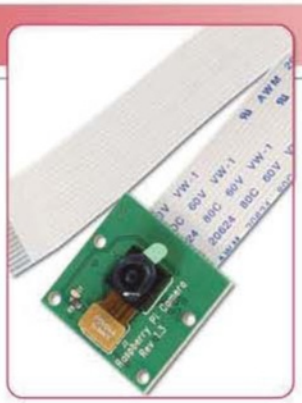

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Welcome

to issue 133 of Linux User & Developer

Your team of Linux experts...

Rob Zwetsloot studied aerospace engineering at university, using Python to model complex simulations in class. Rob is the cog that makes the Linux User & Developer wheels turn. Among tutorials and reviews this month, Rob travelled to Canonical to learn about Ubuntu for Phones for our massive 10-page exclusive.

Joey Bernard is a true renaissance man and splits his time between building furniture, helping researchers with scientific computing problems and writing Android apps. This issue Joey shows us how to SSH from locked-down computers via the web (pages 40-43).

Sean Tracey is a creative technologist at a leading digital agency. He spends a lot of his time living inside Node.js, Python and Arduino. For this issue, Sean provides an excellent introduction to Go Lang, one of the most exciting new languages of recent times. You can find his guide starting on page 50.

Michael Reed is a technology writer, and he's been hacking away at Linux for over 15 years. He specialises in desktop Linux solutions among other things. For issue 133, Michael demonstrates the steps required to package both RPM and DEB software – turn to pages 36-39.

Jon Masters is a Linux kernel hacker who has been working on Linux for some 18 years, since he first attended university at the age of 13. Jon lives in Cambridge, Massachusetts, and works for a large enterprise Linux vendor. You can find his indispensable Kernel Column on pages 22-23 this month.

Gareth Halfacree is our resident news reporter and brings us the latest from all over the open source ecosystem, starting on page 10. Also this issue, Gareth reviews the FUZE Raspberry Pi case, which takes us back to the Eighties with its amazing BBC Micro stylings.

This issue

» SSH from the internet
» Install Ubuntu for Phones
» Build your own packages
» Control your Pi from the web

Welcome to the latest edition of Linux User & Developer, the UK and America's favourite open source and Linux magazine.

It's no secret that our love for Ubuntu has been waning in recent years. A particular set of design decisions have recently led to Canonical's Mark Shuttleworth earning the first award at Austria's Big Brother Awards last month for what essentially boils down to 'invasion of privacy'.

To be fair to Canonical, it has been gradually dialling back its lacklustre approach to privacy and we hope to see the matter resolved to everyone's satisfaction by the time the next Long Term Support release rolls around in April 2014. As always, we'll be keeping a close on development, but we do wonder whether it's possible to strike a happy medium from Canonical's current vantage point.

You can't blame Canonical for working to generate an income from its products and services and it's hard not to admire the firm's remarkable drive and ambition – without it we wouldn't have Ubuntu for Phones, a very exciting development we cover in great detail starting on page 24.

Over the course of the 10-page article we speak to its product manager, Richard Collins, demonstrate its installation and test the first stable release, which hit with Ubuntu 13.10.

Russell Barnes, Editor

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Linux Foundation president Jim Zemlin fires up the crowd at the start of LinuxCon Europe

EVENT

"The free guys tend to win"

Rory MacDonald reports from the show floor of LinuxCon Europe, the biggest event in the Linux and open source calendar

At every LinuxCon, Linux Foudation president Jim Zemlin has to find some new statistics on the success of Linux. It must be getting harder and harder joked Citrix's Mark Hinkle, who followed Zemlin on stage: "How many ways can you say it? Basically, we just won." However, Zemlin played his role dutifully, kicking off this year's LinuxCon Europe with his usual flurry of zeal and enthusiasm.

Jonathan Corbet chairs the annual Kernel Developer Panel

In the last two years, 75 per cent of new enterprise application deployments were on Linux, he told the audience at the Edinburgh International Conference Centre. Referring to cloud and virtualisation, Zemlin noted: "When you have abstracted the OS, the free guys tend to win underneath."

And there was plenty of virtualisation news coming from the world of Linux.

Software-defined networking sees the Daylight

The Open Daylight Project (ODP) used LinuxCon to announce 'Hydrogen', its first official release due out at the end of this year. Hosted by the Linux Foundation, ODP aims to build a complete open source platform for software-defined networking.

"The networking world has gone from a legacy mindset to full throttle, redefining the way we build and manage our networks, and we [the Open Daylight Project] want to be at the centre of that," commented Red Hat's Chris Wright, kicking off the ODP seminar track with an introduction to the project.

SDN essentially provides a level of software abstraction between the physical network infrastructure and the data plane. This delivers the networking equivalent of server virtualisation, with similar flexibility and efficiency benefits. Importantly, SDN also allows the network to follow virtualised applications when they are moved around between different physical servers with different physical network ports.

ODP has essentially bolted together a number of open source components that have been contributed by various companies, including Cisco, Ericsson, NEC, Plexxi and Radware. This has enabled the project to build what it claims is a production-ready release in little more than six months.

The project binds directly into the OpenStack's 'Neutron' networking-as-a-

Vacancies to fill

One very clear message from all corners of LinuxCon Europe was the number of job vacancies in Linux development. Jim Zemlin highlighted the acute skills shortage as a challenge for the Linux community during his keynote, acknowledging that there is "a huge talent war" going on for Linux developers.

"In the next few years, LF will be rolling out more and more training programs and initiatives to address the skills shortage," he promised.

Wandering around the conference, it certainly seemed like almost all the corporate attendees were out to recruit developers. While the UK and other Western economies may be promising faint signs of growth, it was clear that open source software has never really stopped growing.

And Linux development was not the only skill in demand. Linux Foundation board member and Hitachi developer Hisashi Hashimoto claimed that HTML5 development is set to become the most demanded skill over the next few years. Even Cloudius, the newly formed company behind OSv, was actively recruiting during their presentation.

service interface – and, in conversation, the project team told us that they are working on integration with Apache CloudStack. In addition, a 'northbound' REST API allows ODP to be used as a platform for Network Functions Virtualisation (NFV). This allows functions such as firewalls, network monitoring, load balancing and encoding to be delivered as flexible virtualised services, rather than through more traditional hardware appliances.

Connecting into the hardware, ODP offers interfaces and protocol plug-ins for OpenFlow, Open vSwitch, OVSDB, NETCONF, LISP, BGP PCEP and SNMP. However, with many larger switch vendors still implementing their own versions of the open standards, it remains to be seen how well the community distribution of ODF will function with common enterprise hardware, and particularly with legacy equipment. Quizzed on this point, Wright commented that the ODP expected some of the larger networking vendors to produce their own proprietary distributions of project, which uses the liberal Eclipse Public License v1.0.

OSv, new Competition for Linux?

In the world of virtualisation, 'the free guys', as Zemlin put it, are no longer all about Linux.

"Samsung and Intel plan to relax their grip on Tizen"

As we reported last month, Avi Kivity, the founder and maintainer of the kernel virtual machine (KVM) project, has joined forces with a talented team of developers to build OSv, a new operating system for virtualised environments. In a packed back-room at the event, Kivity and the project's co-founder Glauber Costa gave European developers an introduction to OSv.

The new operating system is based on the principle that the typical Java application currently running in the cloud sits on top of a hypervisor, an operating system and then a Java Virtual Machine (JVM), with the three layers duplicating much of the same abstraction and protection functionality. OSv looks to remove any of the OS functionality that is delivered by other elements of the stack.

'Less is more' is the OSv project's motto, which the team decided would look better on boxer shorts than on the usual freebie T-shirt! According to Kivity, in the world of virtualised applications people no longer update long-term processes or production operating systems. Instead, they simply fire up a new virtual machine with an updated stack, load their application and use a load balancer to fade activity over slowly. "If it works, keep going; if not, switch back. It's far more resilient," he explained.

OSv has no drivers to consider, no boundary between kernel space and user space, no use of containers and is completely stateless. The result is an operating system written in around one million lines of clean C++ code, which the team claim is simpler, faster and requires much less administration than any custom Linux distribution.

The initial builds of OSv have focused on running Java applications, offering up the same APIs as the Linux kernel to remove any need to port applications to the new operating system. "To run a Java application, you need to breathe, and you're done," claimed Kivity. OSv does not currently support the entire POSIX API. However, the team claimed that they run a large enough subset to make it possible to port most C applications relatively easily.

The operating system currently runs on the KVM hypervisor, with Xen support in development. And after discussing performance, a Microsoft executive attending the presentation also seemed very keen on porting OSv to his firm's Hyper-V platform.

Tizen goes for open development

One area where Linux is undeniably winning against the competition is on the smartphone. But mobile Linux has never been limited to Android. The Tizen platform was hard to miss at LinuxCon Europe, with its own mini-conference running within the event, and with Samsung and Intel, the two largest exhibitors at the conference, heavily plugging their new love child.

The big news for the conference was that these two corporate giants are planning to

Samsung's prototype Tizen hardware on show at LinuxCon

The Linux-based Steam Box gaming console – saviour of the Linux desktop?

relax their grip on the project, with Tizen being moved to a new open governance model. Although both companies had hinted at this last month, they confirmed that, as of the next 3.0 release, the project will be run through an open meritocracy and accept community contributions to the core code.

While founded by Samsung and Intel, the Tizen project is hosted by the Linux Foundation. The new governance model is almost certainly intended to differentiate the project further from Android's criticised 'Source Available' model, where Google manages the project's direction and writes the code behind closed doors.

"We couldn't create Tizen without open source," Yoonsoo Kim, one of the project's core architects at Samsung, told the conference. "We are trying to be a good citizen."

Tizen's attempt at greater openness has echoes of the ill-fated Symbian Foundation, where the dominance of Intel and Nokia thwarted attempts to create a meaningful open community. However, the project's new community manager, Intel's Thiago Macieira, insisted, "We genuinely want to have people who aren't from Samsung or Intel." Maciera also pointed to the fact that Tizen 3.0 will also run on many in-vehicle-infotainment (IVI) devices, giving the very real possibility of greater active involvement from developers from within the automotive industry.

Tizen is certainly reaching out to attract app developers to the new platform. As with most smartphone platforms, Tizen apps can be built to run either in HTML5 or as faster, more full-featured native apps. However, the project claims that Tizen is currently leading the field in terms of HTML5 performance.

Wargaming.net runs the world largest massively multiplayer infrastructure on Linux

Linus Torvalds takes to the stage

Although Samsung and Intel were both silent on the topic of when we can expect the first Tizen devices to launch, Kim told **Linux User** that Samsung's investment in marketing and product development would be the big advantage of the platform for app developers "Samsung will back the platform," he insisted.

The Samsung exhibition stand certainly featured working prototype phones. Staff also told us that developers are now able to access Tizen hardware for testing via the company's remote test lab facility (**developer.samsung.com/remotetestlab**).

Game on for the Linux desktop

During his keynote interview, Linus Torvalds admitted that he was still disappointed by the progress of the Linux desktop.

"People have heard my complaints about the fact that the Linux desktop is this morass of infighting and people who do bad things," he explained. "And it's not so much the internals. I think we are actually doing a reasonably good job in enabling people to do a Linux desktop.

"But I do hope that the desktop people will just try to work together and work more on the technology than trying to make the login screen look really nice," Torvalds said to a burst of audience applause.

Both Jim Zemlin and Torvalds expressed their hope that the current moves towards Linux in the gaming industry would drive progress on the desktop. In particular, both men drew attention to the recent development of SteamOS on Linux:

"What I like about Steam in particular, is that Steam is one company that has a vision of how to do things and I think that will force a lot of the other vendors around them," said Torvalds. "I am not just saying it will help us get traction with the graphics guys. The different distributions will realise: if this is the way Steam is going, we need to do the same thing because we cannot afford to be different in this respect. Because we want people to play games on our platform too. It's the best form of standardisation."

Girls can play, too!

Another audience question fired at Torvalds during his on-stage appearance was whether, as the leader of the Linux community, he felt more could be done to get more women involved in Linux kernel development. "It's a hard question; I don't have any easy answers to that. It's clearly something we want to solve," he responded. "But despite the fact that we have very few women, I am not very pessimistic. We used to have this very same discussion about ten years ago about the fact that we had very few Japanese developers. We can fix it."

In a presentation later that morning, Intel kernel developer Sarah Sharp drew attention to one way the kernel community is working on a fix. Headed by the GNOME Foundation, The Outreach

Free software and the NSA

The other inescapable theme at the conference was information security and the surveillance state, brought on by the revelations of NSA whistle-blower Edward Snowden. Presentations ranged from a call to arms from the Free Software Foundation Europe (FSFE) president Karsten Gerloff, through to practical guides on security, network monitoring and intrusion detection tools.

Painting a dystopian vision of the current situation, Gerloff called for technically literate volunteers to assist the FSFE in lobbying EU and national European politicians. He said that very few politicians understand the important underlying technology issues that impact our daily life, explaining that lobbying and informing them is possible and makes a difference. However, he warned that public apathy was allowing paid corporate lobbyists to dominate the process.

Following Linus Torvalds on stage, the final keynote speaker Mikko Hypponen also attacked apathetic attitudes to government surveillance. Citing the common argument 'Why worry if you have nothing to hide?', he retorted: "If you do have nothing to hide, then tell me. Because then I know I cannot trust you with a secret!"

Hypponen claimed the internet has become a new form of US colonisation, clarifying that under US law, the government claims the right to monitor all foreign citizens when data enters the US. Both Gerloff and Hypponen offered the same solution: use free and open source software and don't use US corporate systems and services.

"I suggest that open source provides a solution to this problem. Then countries don't have to work alone. It will be secure, open and free," Hypponen concluded.

Program for Women offers internships with a $5,000 stipend for women interested in open source development. The programme requires that applicants must already have contributed their first patch to their chosen project. Given the difficulty for any developer in getting a first patch accepted into the kernel, this forced the Linux Foundation to develop a dedicated guide: **kernelnewbies.org/OPWfirstpatch** (a valuable resource for anyone looking to enter kernel development). With this in place, the Linux Foundation has already placed seven women into kernel internships in the first wave.

Importantly, the internships are not only open to newly qualified graduates. Sysadmin Elena Ufimtseva showed how she had used the intern programme as a means of career progression. While at the other end of the scale, Laura-Mihaela Vasilescu has returned to academia following the internship, starting a dedicated team promoting Linux kernel development within the Romanian education system.

Keynote speaker Mikko Hypponen says open source is the answer to the surveillance state

ONLINE

Google funds open source security patches

Extends bounty programme beyond its own software

Google will pay up to $3,133.70 for security improvements to a range of open source projects

Online search and advertising giant Google has announced an extension to its Vulnerability Reward Program, designed to provide cash incentives for security researchers to provide it with warning of flaws in the company's various applications and services. This will see Google fund security enhancements in a wide range of free, libre and open source software packages.

"We all benefit from the amazing volunteer work done by the open source community," explained Google Security Team member Michal Zalewski of the move. "That's why we keep asking ourselves how to take the model pioneered with our Vulnerability Reward Program – and employ it to improve the security of key third-party software critical to the health of the entire internet.

"So we decided to try something new: provide financial incentives for down-to-earth, proactive improvements that go beyond merely fixing a known security bug. Whether you want to switch to a more secure allocator, to add privilege separation, to clean up a bunch of sketchy calls to strcat(), or even just to enable ASLR – we want to help!"

Initially, Google is accepting submissions for security improvements made to OpenSSH, BIND, ISC DHCP, libjpeg, libjpeg-turbo, libpng, giflib, Chromium, Blink, OpenSSL, zlib, and Linux kernel components. The company has also revealed plans to expand the programme in the future to include popular web servers, SMTP servers, compiler and linker toolchains, and the OpenVPN virtual private networking platform.

Developers who have improved any of the above projects can qualify for a cash reward of between $500 and $3,133.70 direct from Google. Patches are simply provided directly to individual projects' maintainers; then, when accepted and merged into the repository, details are sent to Google. Should the company decide the submission has what Zalewski describes as "a demonstrable, positive impact on the security of the project," the cash will be granted.

Qualifying submissions include improvements to privilege separation, memory allocator hardening, cleaning-up of integer mathematics, systematic fixes for race conditions, and elimination of error-prone design patterns or library calls.

"We thought about simply kicking off an OSS bug-hunting program, but this approach can easily backfire," claimed Zalewski. "In addition to valid reports, bug bounties invite a significant volume of spurious traffic – enough to completely overwhelm a small community of volunteers. On top of this, fixing a problem often requires more effort than finding it."

The programme is open to almost all, including project maintainers themselves, excluding individuals found on or located in countries on US government sanction lists, such as Cuba, Iran, North Korea, Sudan and Syria – regardless of whether or not a patch from such an individual is accepted by the project maintainers.

More information on the programme, including how to make a submission, can be found at **tinyurl.com/patch-rewards**.

OPEN SOURCE

Oracle attacks open source

Claims higher ownership costs, inferior products

Oracle, which became the corporate owner of several open source projects with its acquisition of Sun Microsystems in 2009, has gone on the attack against FLOSS and is actively discouraging its use.

In a white-paper, entitled The Department of Defence (DoD) and Open Source Software, the company puts forward a range of reasons for the US government department to eschew open source software and its methodologies.

"Total cost of ownership (TCO) for open source software often exceeds that of commercial software," the paper claims. "While minimising capital expenses by acquiring 'free' open source software is appealing, the up-front cost of any software endeavour represents only a small fraction of the total outlay over the life cycle of ownership and usage.

"Government-sponsored community development approaches to software creation lack the financial incentives of commercial companies to produce low-defect, well-documented code and are not subject to the same market pressure at the software code level," the document continues, before reaching its inevitable conclusion: "For the intensive, mission-critical capabilities required by most DoD projects, Oracle recommends its flagship commercial [closed-source] software products."

The white-paper can be read in full at tinyurl.com/oracle-attack.

ORACLE

■ Oracle has claimed that open source projects are more expensive and of lower quality compared to proprietary products

HARDWARE

Tilera launches add-in accelerators

Many-core computing specialist Tilera has announced a new add-in board for servers, which packs its Tile-Gx 64-bit processors onto a PCI Express card to greatly boost performance on parallelisable workloads.

The base model, the TILEncore-Gx9, includes two 10G Ethernet ports, 4GB of on-board memory, and a nine-core Tile-Gx processor optimised for networking, video and cloud offload. Models with 16 and 36 cores are also available, with the flagship TILEncore-Gx72 offering 72 processing cores, 16GB of memory and eight 10G Ethernet ports.

The Tile-Gx processors can be programmed in ANSI-standard C/C++ or Java using the familiar GNU toolchain, the company has claimed, with its initial target markets being network function virtualisation and software-defined networking vendors.

■ Tilera's TILEncore cards offer considerable offload capabilities, thanks to the firm's Tile-GX many-core processor design

Pricing has not yet been confirmed, but is expected to sit around the level of rival devices such as Nvidia's GPU-based Tesla accelerator boards or Intel's 50-core x86 Xeon Phi co-processor cards.

Linux calendar

03 December 2013 — ThingMonk

» Shoreditch Works Village Hall, Hoxton Square, London
» UK
» thingmonk2013.eventbrite.co.uk

Aimed at Internet of Things entrepreneurs and enthusiasts, speakers at the ThingMonk pop-up conference include Alexandra Deschamps-Sonsino, Matt Webb, Ian Skerrett, Nick O'Leary and Rick Bullotta.

04 December 2013 — Actuate Customer Day

» Sheraton Times Square, New York
» USA
» actuate.com/acdny

Designed for users of the BIRT open source business intelligence toolset, attractions at the Actuate Customer Day include demonstrations from chief executive Pete Cittadini, technical tracks and expert tutorials.

06 December 2013 — Open Source Conference

» Beurs van Berlage, Amsterdam
» Holland
» opensourceconference.nl

Featuring breakout sessions for both management and technical staff, the Benelux Open Source Conference includes talks from Red Hat, Gartner, Accenture and IBM.

09 December 2013 — OpenStack Israel

» NICE, Ra'anana
» Israel
» www.openstack-israel.org

In its fourth year, OpenStack Israel brings industry leaders and local OpenStack users together, and is followed by a three-day training course on the latest OpenStack release.

BIG DATA

MapD takes Big Data to GPUs

Massively parallel platform promises significant performance gains

A new database dubbed MapD aims to significantly speed the analysis of big data sets using the parallel processing capabilities of modern graphics processing units (GPUs) at a fraction of the cost of dedicated computer clusters.

The brainchild of Todd Mostak of the Massachusetts Institute of Technology, MapD aims to tap into the considerable compute performance of commercial off-the-shelf graphics cards to allow for fast analysis of hundreds of gigabytes of data.

"MapD uses a hybrid multi-CPU/multi-GPU architecture running across multiple nodes," explains Mostak of his creation. "This architecture allows for the massive parallelisation of the querying, analysis, and visualisation of big datasets, and results in an increased speed of processing, in the order of multiple orders of magnitude, across many of the various big data workloads common today."

The MapD system is designed to minimise memory access costs during GPU acceleration, generating GPU assembly code directly for a given query plan, and uses the returning of indexes or compressed bitmaps of matching rows from the GPU to the CPU after a filter operation to avoid the PCI Express transfer bottleneck.

The platform is already being used to perform rapid analysis of public data sets, in particular Twitter messages, to create heat-maps and other graphical visualisations as close to real time as possible.

MapD can be used to dramatically accelerate database analysis on off-the-shelf GPU hardware

More details on MapD's operation, along with examples of its use, are available in Mostak's white paper, which you can find at geops.csail.mit.edu/docs/mapd_overview.pdf.

LINUX

National Gendarmerie jump to Linux

France's national police claim dramatic savings from the move

The National Gendarmerie, France's national police agency, has successfully moved more than half of its desktop computers to a customised version of Canonical's Ubuntu Linux distribution, with plans to move the remaining desktops to the platform by mid-2014.

The organisation's move to Linux on the desktop started in 2004 with a shift to free, libre and open source packages such as OpenOffice and Firefox running on existing Windows systems. Once users had been trained in these and had shown acceptance of the software, the switch to using the same packages on Linux began – and is now more than half finished.

According to Major Stéphane Dumond, the move to the GendBuntu Linux distribution has resulted in a lowering of the total cost of ownership of the National Gendarmerie's desktop systems by 40 per cent – slashing thousands from its operational costs.

"The direct benefits of saving on licences are the tip of the iceberg," Dumond claimed at the Evento Linux conference. "An industrialised open source desktop is a powerful lever for IT governance. It is possible to deploy thousands of Linux desktops. We did."

The National Gendarmerie of France has saved thousands by moving its desktops to GendBuntu Linux

The move, to be completed next year, will leave the National Gendarmerie running around 72,000 GendBuntu Linux desktops – Europe's largest public deployment of open source desktop operating systems. The move will save the organisation considerable money and has already resulted in a significant reduction in support requests from its users.

The successful switch has had a major impact on the National Gendarmerie's overall technology strategy, which now concentrates on large-scale usage of FLOSS solutions, open standards and centralised desktop life-cycle management.

Linux PRNG 'not robust'

A security analysis of the Linux pseudorandom number generator (PNRG) has revealed it may not be as robust as has been thought.

Petitions to excise NSA-provided code from the Linux PNRG implementation were quickly shouted down by project founder Linus Torvalds who claimed the system is entirely secure.

A new research paper suggests this might not be the case, however, pointing out flaws in the system which are claimed to negatively impact its security. So far, Torvalds has not responded to the paper's findings, nor its proposal for a new construction with improved efficiency.

The research paper can be accessed at eprint.iacr.org/2013/338.pdf.

CLOUD

CoreOS gets venture funding

New cloud platform receives a few million to get started.

CoreOS, the Linux-based cloud-centric operating system, has received funding of between $1 million and $5 million from the Andreessen Horowitz and Sequoia Capital investment groups, its co-founder Alex Polvi has told technology investment site TechCrunch.

An alumnus of the Y Combinator accelerator programme, CoreOS is a server-centric Linux-based operating system built around the same rapid-deployment paradigm as Google's Chrome OS.

Designed primarily with cloud computing in mind, CoreOS uses the Docker container platform to overlay applications on a read-only, automatically patched and lightweight operating system base. This, its creators claim, will dramatically simplify large-scale virtualised server maintenance.

The money is to be used to offer commercial implementations of the software to high-profile enterprise customers, with a simple click-through setup system to walk users through their first deployments.

CoreOS has received over $1 million in venture capital to pursue its vision of an operating system for the cloud

GAMES

Game developers back Linux

Valve's SteamOS push reignites interest in the platform

Valve's announcement of a Linux-based gaming-centric operating system dubbed SteamOS, designed for playing PC games in the living room on compact and low-cost devices, has reignited interest in developing games for Linux.

The company's announcement has spurred several software firms behind triple-A titles to pledge their interest in developing for SteamOS specifically and Linux gaming in general, promising an explosion of commercial support for the platform.

DICE, the studio behind the popular Battlefield series, has told press that "we strongly want to get into Linux," while Creative Assembly has stated that there is "absolutely no reason" why it couldn't port its games, including recently launched *Rome: Total War II*, to the platform.

Traditionally, developers have written for consoles first, then ported to Microsoft's Windows platform and its DirectX application programming interface. In recent years, many have included Apple OS X ports, and now it seems Linux will be on the list too.

The release of Valve's Steam digital distribution platform has already had an impact on the number of commercial games available for Linux, and the company promises to port all its own titles across as soon as possible, with many already completed.

GAMES

SteamOS: the future of Linux?

Valve's new controller is causing quite a stir

While SteamOS may primarily be about delivering videogames to more people, its effect will be much more far-reaching

The buzz around Valve's SteamOS has been very strong over the past month, with a lot of people weighing in on how it will change the face of gaming and help reassert the PC as a more dominant gaming platform. While it may undeniably have an impact on the videogame landscape, it will also have wide-reaching effects in Linux and computing in general.

One of the expected outcomes of SteamOS is a new migration of PC users to Linux. Technically, they'll already be using it if they have a Steam Machine or a system running SteamOS, but it's more important that they begin to use it on their desktop PCs or laptops. While there are always those who'll point at a piece of news and proclaim this means the year of the Linux desktop, SteamOS could very much be a first step into mass Linux adoption. Right now it's down to Valve's implementation of SteamOS to make or break it as a gaming OS, but if it's as open as they say it'll be, it could be a lot of people's first foray into using Linux.

The MintBox can already run Steam via the Ubuntu version, although without the streaming functions

While a greater adoption rate will help the prominence of Linux, dispel some of the myths and bring more into the community, that's only a small piece of how SteamOS might aid Linux. Speaking about it at LinuxCon Edinburgh, Linus Torvalds himself stated that he feels the announcement could help the desktop side of Linux in other ways, such as graphics for example.

Just over a year ago, a video of Torvalds went viral where he half-jokingly flipped the bird to graphic-chip manufacturer Nvidia. While this was done for theatrics, his frustration with the company is real, and shared by the community. While rival hardware manufacturer AMD supports Linux with open source drivers, Nvidia continued to keep its drivers closed. All this changed, though, when SteamOS was announced, with Nvidia reaching out to the open source community.

Andy Ritger, director of UNIX software at Nvidia, sent a message to the developers of Nouveau, the project that reverse-engineers Nvidia drivers, sending them new materials about the GPU structure that could help them with development. "Nvidia is releasing public documentation on certain aspects of our GPUs," Ritger's message read. "[The intent is] to address areas that impact the out-of-the-box usability of Nvidia GPUs with Nouveau. We intend to provide more documentation over time, and guidance in additional areas as we are able." His message went on to state that "a few of us who work on Nvidia's proprietary Linux GPU driver will pay attention to the Nouveau lists" and they'd "try to chime in when we can".

For Linus to be happy about the direction Nvidia will take is a huge sign of progress

Nvidia opening up like this is a great step towards a better relationship with the Linux community, and Torvalds thinks this is only the beginning: "I'm not just saying it'll help us get traction with the graphics guys; it'll also force

SteamOS's effect on Linux extends further than just more games on the OS

different distributors to realise if this is how Steam is going, they need to do the same thing because they can't afford to be different in this respect. They want people to play games on their platform too. It's the best model for standardisation; I think good standards are people doing things, saying 'this is how we do it' and being successful enough to drive the market."

Hardware manufacturers may also see the benefit of selling hardware with an OS that doesn't require an expensive software licence. CompuLab – creator of miniature PCs – already sells systems that come preloaded with Linux, such as the MintBox. CompuLab itself is very interested in SteamOS from a hardware manufacturer point of view.

"SteamOS is a very exciting project," Irad Stavi, chief product officer, told us. "While today Linux is at the core of many non-PC gaming platforms, it is concealed beneath layers of proprietary closed-source code. I sincerely hope that SteamOS will start the momentum of making Linux in its open form a capable gaming OS. I think building that momentum will take time, so the architecture of the first-generation SteamOS computers is likely to be similar to today's Windows gaming rigs. Over the upcoming product cycles, I predict that low-power CPUs will see dramatic improvement in performance."

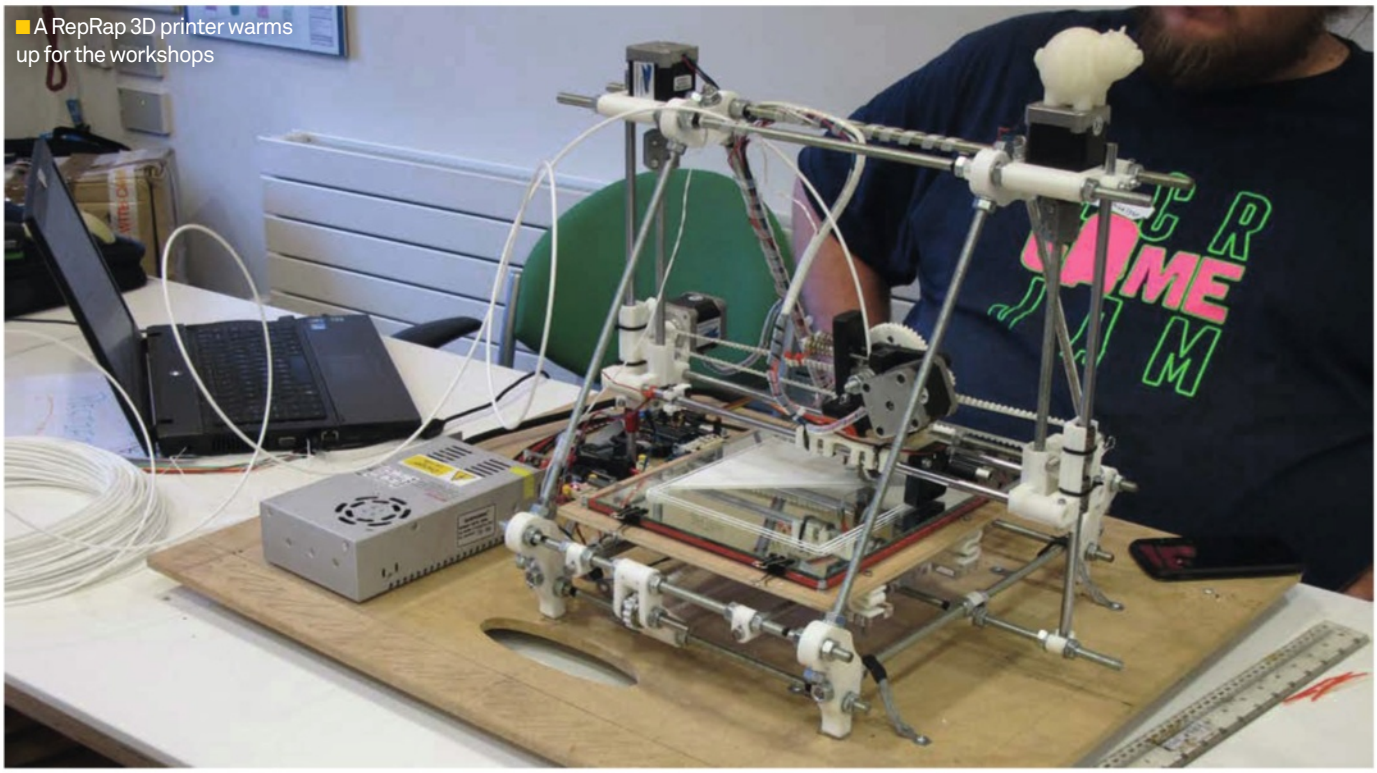
With the possibility of better hardware, better hardware drivers and more sympathetic distributors, it's not just about the future of videogames but also the future of Linux.

Stalled

When it was first announced that Steam would be coming to Linux, Richard Stallman was none too pleased at the idea. Steam itself is a closed platform, employing DRM measures. While he hasn't commented on SteamOS itself yet, the game distribution method will be the same, even if the OS is open.

"I suppose that availability of popular non-free programs on GNU/Linux can boost adoption of the system," he said in a blog post when the announcement was originally made. "However, our goal goes beyond making this system a 'success'; its purpose is to bring freedom to the users. Thus, the question is how this development affects users' freedom.

"The problem with these games is not that they are commercial. (We see nothing wrong with that.) It is not that the developers sell copies; that's not wrong either. The problem is that the games contain software that is not free (free in the sense of freedom, of course)."


A RepRap 3D printer warms up for the workshops

EVENT

Earning a living from the IoT

The UK's grass-roots open source hardware community make careers from hobbies

Once a year, the cosy Yorkshire mill town of Hebden Bridge is invaded by robots. Rooms fill up with RepRap 3D printers, PCBs, Arduinos and the odd Raspberry Pi, all being tweaked, modded and hacked to perform the most amazing feats. 'OSHcamp', run by the Open Source Hardware User Group (OSHUG), is becoming an annual pilgrimage for the UK maker community. The most noticeable change at this year's event (co-located within the Wuthering Bytes Festival) was a stronger focus on business. So we asked Paul Tanner, one of OSHUG's contributors, if this was representative of a bigger change in the world of open source hardware. Has the hobbyist world of hardware hacking grown up and put on a suit and tie?

"There are certainly more commercial project opportunities within the Internet of Things (IoT) space... But the hobby aspect and fun are still very much at the core of everything. It's just great that more people are now getting to earn a living out of doing what they love," replied Tanner.

Active house

Tanner and his colleagues have been working on the development of a new 'active house' for a London architect. The project is using open hardware sensors, actuators and Arduino processors as well as a Raspberry Pi to minimise energy requirements. It will make more effective use of natural sunlight, thermal shutters, ventilation and lighting.

"The house, entering its trial phase shortly, will work intelligently around its inhabitants, both autonomously and using nudges where appropriate," Tanner told us. "We are using room-based modules and some specially designed shutter systems, and we intend that the whole system will be low-cost, both hardware and software being open-sourced."


The most intelligent house in North London – kitted out by Paul Tanner and his team

Adrian McEwen talks to a packed Hebden Town Hall

LINKS

Videos of OSHcamp/Wuthering Bytes:
wutheringbytes.com
oshug.org/event/oshcamp2013

More on Chris Atherton's views:
finiteattentionspan.wordpress.com

Adrian McEwen's blog (with links to his new book 'Designing the Internet of Things'):
www.mcqn.net/mcfilter

The digital exploits of Shay Moradi:
www.organised.info *rith.co.uk*

The Robot Operating System (ROS):
www.willowgarage.com/pages/software/ros-platform

Aral Balkan's plans for Prometheus:
codename-prometheus.eu

Among presentations on 'Building a Maker Business' and the increasing commercial use of WordPress, London-based User Experience (UX) consultant Chris Atherton gave one of the standout business sessions of the day, entitled 'Falling in Love with your Product's Users for Fun and Profit'. The talk highlighted the very real need for open source businesses and projects to take greater account of users. After admitting that she spent most of her teenage years hating people, Atherton moved through an amusing potted autobiography to explain how she eventually ended up working in UX consultancy, by finding something about products' users that she 'loved'.

"The number one rule for making better stuff – spend time with people [that use it]," she said, highlighting that users are not homogenous and playing down oversimplified marketing techniques such as AB testing. Her simple message was then backed up by a powerful framework for studying and learning to 'love your users'.

Not all good news

Predictably, the commercialisation of the IoT isn't all good news for the open source world. In his presentation, Adrian McEwen, arch-maker and author on the IoT, warned of the danger of creating a 'CompuServe of Things' – drawing parallels between the gated ISP networks (CompuServe and AOL) at the dawn of the internet and the combined hubs or bridges used at the heart of many IoT offerings. He explained how, with Wi-Fi connectivity drawing too much power for most wireless IoT devices, conflicting standards such as ZigBee, Bluetooth and Z-Wave are getting in the way of interoperability. Low-powered wireless IoT bridges offer open APIs, but are usually proprietary beyond this, tying into closed systems hosted in the cloud. However, he also warned against prolonged, futile discussion on creating a single standard for the IoT: "It's about doing, not talking. We need to work on solving practical [interoperability] problems. We already have all the protocols and standards for the IoT: it's called 'The Internet'," he explained. "The IoT covers too many areas of our lives for there to be one way of doing things. We need to focus on solving real problems with existing technology and tweak where you need it."

> "There are more commercial project opportunities within the IoT space"

However, OSHcamp was far from just talk of the business and politics of the IoT. Attendees had been soldering away at many practical problems, and there were plenty of projects on show. Shay Moradi's presentation showed how his practical approach to getting things done has led to some phenomenal successes. The Huddersfield-based former lecturer had been asked by Channel 5's *The Gadget Show* to produce a computerised referee for real-world football matches. Competing against universities with high-end camera equipment, Moradi and his colleagues from Running in the Halls (RITH) read up on the offside rule and stuck together a solution using webcams, sensors, notebooks and open source software. Their 'Digital Duck Tape' approach, with a focus on getting things working before getting them perfected, won the competition.

RITH has since been asked back for several further challenges on *The Gadget Show*, as well as building the world's 'largest' multiplayer game on the side of a London tower block for Stephen Fry's *Gadget Man* series on Channel 4.

Robot OS

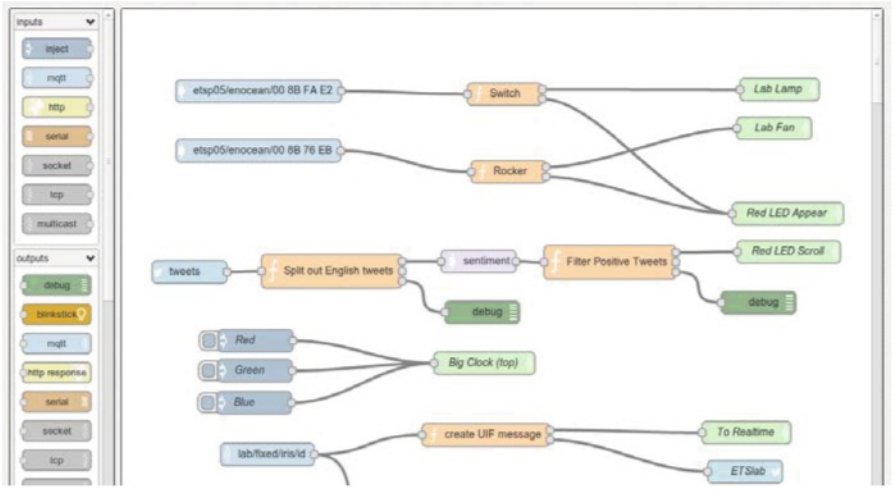
Nick Weldin, a technical tutor at Middlesex Uni, gave a practical introduction to Willow Garage's open source ROS (Robot Operating System) from the helpful perspective of a new user. Weldin explained how before the creation of a common robot operating system, most software had been developed for specific robots and could not be reused. With ROS's new culture of sharing and reuse, many of the basic features, which previously took years to develop for each new device, are available through relatively simple configuration.

Use of ROS begins with defining the basic parameters of your device using the Unified Robot Description Format (URDF) XML model. After this, motion, modelling, sensing. mapping and even inverse kinematics (the process of recalculating routes around an obstacle) are available as out-of-the-box features in ROS.

Although the demo fell through during the presentation, in true hacker style Weldin persevered. By the evening, his own £1,000 droid

News
The latest in the Linux community

OPEN SOURCE



IBM's Node-RED – a visual interface for the IoT

was busily navigating drinkers to produce an impressively accurate map of the beer terrace in Hebden Town Hall. Weldin is currently planning a pre-Christmas robot hack-day at Middlesex Uni.

But there was plenty more on show before the drinking began. In an entertaining talk, mixing up usability and design with data freedom, designer and award-winning speaker Aral Balkan gave the audience details of his new Prometheus project. "Design is not democratic!" declared Balkan, as he equated Apple's success to its complete control of the hardware and software experience. Prometheus, he went on to explain, aims to create an open version of this kind of ecosystem, with himself as the benevolent dictator of design.

As with so many open source-focused events, the impromptu 'lightning talks' at the end of the day also offered up some gems. Fresh from having raised nearly a quarter of a million pounds on Kickstarter, Bradford local John McLear gave the audience a pre-launch intro to his NFC Ring project.

Developed in conjunction with Matt Mullenweg, creator of the WordPress CMS, the ring is a simple piece of jewellery containing two 20mm by 6mm near field communication (NFC) chips: one for public and one for private data. Using two tiny radio antennae, the ring can be used to automatically unlock phones and other NFC-enabled devices. It also can be paired with NFC door locks for your home or office and used to hold and transfer images, contact information, social media links and public SSH keys. In fact, using the project's open source software and app, it is possible to invent your own uses and program custom actions on different devices.

"We need to make sure that this technology is owned by the people and can be used by the people and not just by the big contractors that have approached us so far," said McLear, talking about the project's future – which includes long-term plans to incorporate cameras for scanning blood platelets and health monitoring.

Another highlight of the lightning talks was an early demo of IBM's Node-RED project to create a new visual interface for wiring together the IoT. The project offers a browser-based drag-and-drop interface for defining interdependencies and flows between hundreds – even thousands – of devices, sensors and actuators.

New 'nodes' can be added with a few lines of JavaScript/HTML, and their parameters and characteristics can be defined and altered through the tool. The idea is that as the number of nodes in an IoT network is set to explode, Node-RED provides a single interface for defining how you want systems to behave. Rather than hard-coding actions in each device, the interface allows you to define and optimise the behaviour of devices and to create and refine the complete system holistically.

As the DJs kicked off and the bar opened, we wandered over to Andrew Back, the event's rightfully contented organiser. With the prospect of a second day dedicated to letting attendees get hands-on with much of what they had seen in the previous eight hours, Back was already discussing plans for next year's event: bigger, better, maybe even a week long!

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THE FREE SOFTWARE COLUMN

Talking about the internet

The internet and the digital tools that allow us to interact over the wires or the airwaves have radically changed the way we communicate, and the way we live

Richard Hillesley writes about art, music, digital rights, Linux and free software for a variety of publications

Before the invention of the printing press and the upheavals of the industrial revolution, human society depended almost exclusively on oral communication. In the last 120 years, an array of inventions – from electric lighting to home refrigerators and TV – have transformed the way we live, but the digital revolution of the last 20-30 years is just as transformative. The new technologies are redefining the possibilities for information exchange and the dissemination of ideas, and how we respond to them. The promise of the digital revolution is that knowledge and ideas become a universal resource for all, that the internet might give us ways to find a new vision and understanding of how ideas are owned and shared, without the interference of government or corporations.

Of course, it doesn't really work like that. The web, which is a universal access point for all, is also a magnet for commercial interests and those who want to control us. And some of the effects are negative. Paradoxically, the net both increases and decreases the choices we have before us. David Byrne of Talking Heads argues that "The internet will suck all creative content out of the world." Amazon makes it easy to buy a book, but its cumulative effect is to reduce the range of books available to us as independent book and record publishers and shops are driven out of business.

A few years ago the slow death of these marginal businesses – and their gargantuan relatives, the record and media companies – was blamed exclusively on users and 'piracy'. But change was inevitable. The internet and globalisation are radically transforming our societies and our lives, our ways of working, and our income and tax distribution. Globalisation is unsticking some of the glue that holds our lives together.

One manifestation of this phenomenon has been the revelation of the scope of surveillance of our citizenry by GCHQ and the NSA, and how the internet has made it easy for them. This revelation has been greeted by massive debate in Europe and the US about democratic oversight and the limits of internet security.

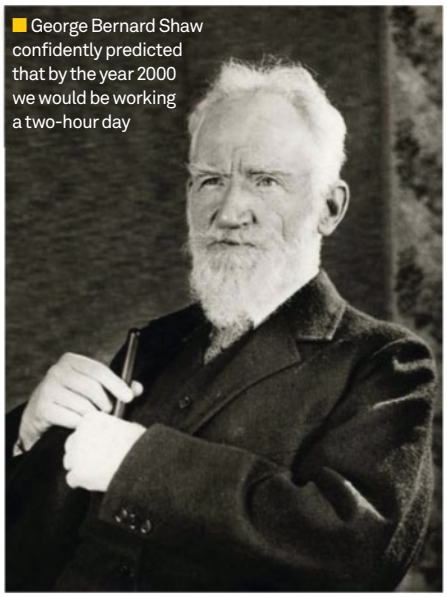
In contrast, the issues have met with a relatively muted response in Britain, where newspapers such as *The Times* and *Daily Mail*, both owned by companies based outside the UK, have argued that *The Guardian* was wrong "to publish material leaked by Edward Snowden on the specific grounds that journalists cannot be trusted to judge what may damage national security." The former Conservative MP, Louise Mensch, has even argued, in the pages of *The Sun*, that the editors of *The Guardian* should be prosecuted for treason; and the Prime Minister, David Cameron, wants a parliamentary committee to investigate not GCHQ, but *The Guardian*. This would seem to be the extent of parliamentary discussion on the real issues of security and privacy. Others, such as *Herald* columnist Iain Macwhirter, have suggested that the constant surveillance by intelligence agencies (and the corporate outlets we use) is very close to the the world of Orwell's *1984*.

"Winston Smith could still go off-line," he noted, "at least for short periods. But today, Big Brother would know exactly where he was thanks to ubiquitous CCTV cameras and global positioning software on mobile phones. Then there is all that Orwellian-sounding 'metadata' that can be and is mined from the net, allowing access to our very unconscious minds through algorithms that analyse what we watch, buy and read; whom we meet and where we go. As for Facebook: Orwell would never have believed it. Millions of people putting their private thoughts onto a public record that can never be erased."

Of course, a wider reality is that all the UK's newspapers are finding it increasingly difficult to survive as economic entities, unable to compete with the net. *The Guardian* is already speculating that its print editions may cease publication within the next few years, and is looking for ways to secure its future as a web-based newspaper.

The internet is far from being the source of all our problems, however, and its faults are a manifestation and reflection of a rapidly changing world. But there is remarkably little creative discussion of how these changes affect the socio-economic realities of our existence. For instance, once upon a time we were promised that technology would be our liberator and free us from the drudgery of work, but remarkably, the discussion of work and its pros and cons is stuck in time, or travelling backwards. Work is 'good'. Those who don't work are 'bad'. And yet the distribution of both time and money throughout our society becomes more unequal. All this is affected by the movement of trade onto the internet, accompanied by suspect employment practices

> "The internet and globalisation are radically transforming our societies and our lives"


George Bernard Shaw confidently predicted that by the year 2000 we would be working a two-hour day

and 'creative' tax avoidance. In a world where industry has been sent offshore, work for most of our fellow citizens is temporary or low paid.

Yet, two centuries ago, Benjamin Franklin predicted that the technological advances of the late 1700s would lead to the four-hour working week. A century later, George Bernard Shaw confidently predicted that by the year 2000 we would be working a two-hour day. Robots would do the washing up, go down the mines, man the factories and vacuum the floors. Technology would be our liberator, and free us for more creative pursuits. In the GNU manifesto, Richard Stallman postulated optimistically that:

"In the long run, making programs free is a step toward the post-scarcity world, where nobody will have to work very hard just to make a living. People will be free to devote themselves to activities that are fun, such as programming, after spending the necessary ten hours a week on required tasks such as legislation, family counselling, robot repair and asteroid prospecting. There will be no need to be able to make a living from programming."

Nobody is expecting working conditions to suddenly improve, or the UK parliament or mainstream press (other than *The Guardian*) to seriously question the activities of GCHQ or the issues of security and invasion of privacy on the internet. But it would be a positive development if these things were to be seriously debated in the wider forums they deserve.

THE OPEN SOURCE COLUMN

Supersmall Me

Simon wants things shrinking down to manageable sizes...

Simon Brew is a technology writer and editor, working across the Linux, Windows and Mac OS X platforms

Any Superman fans in? Any Superman fans who sat through last summer's *Man Of Steel*, wishing they'd paid a bit extra for earplugs on top of their 3D glasses?

What about *Doctor Who* viewers? Or followers of pretty much any big science-fiction TV show? You ever noticed how when your show of choice trundles to the end of its season, that the stakes have to escalate, that worlds have to be put in peril, and that people generally have to stroke their chins and furrow their brows in a deeply concerned manner?

Bigger, we're frequently reminded, is better, after all. Isn't it? That visuals become more impressive, that special effects become more impressive, that more and more worlds find themselves facing certain doom? After all, even **Linux User & Developer** finds itself part of a media obsessed with the biggest number, or the next big breakthrough, or how many downloads were recorded on a day. And even if publications like these choose not to play by those rules, there's little doubt that the rules are nonetheless established.

There's little denying that Linux sometimes falls foul of this too. The excellent DistroWatch keeps an intriguing page-hit ranking as a permanent fixture on its front page, that lists the hits per day on the various assorted Linux distros. To the site's credit, it's gauging interest more than anything here, as it's not recording the number of downloads. And it'd be folly to say that it's not a useful snapshot of the Linux OS in its many flavours. The rise of Linux Mint over the past years has been notable, for those who have followed both Mint and the DistroWatch top 100.

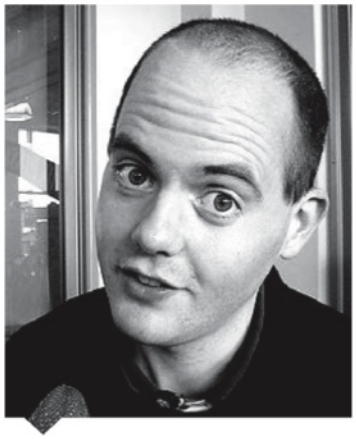
But it's the small stuff that matters, whether we're talking movies, television shows, music or Linux. The best moments in the aforementioned *Man Of Steel* were those when someone turned the volume down and let the characters just have some form of conversation with each other. Television panels at conventions salute individual moments, and characters, over big-ticket moments.

With software, it needs to be the same. In a dim and distant past, I interviewed the chief of the then Cosmi Software, who explained that his business had thrived because he broke all the tasks that Microsoft Office undertook into individual applications, which he then packaged and sold. You might think this a bit cavalier, and a bit against the spirit of things, but his thinking was actually sound: he realised that people didn't go searching for a mass suite of bloat when they wanted something for their computer. They searched for a tool to do an individual job. In much the same way that you go to a DIY store for a specific item, he tapped into that way of thinking and put out smaller, more compact, yet friendlier software tools. And he built, for a while, a big business off it.

I'm not suggesting that we all cut down LibreOffice into chunks and cover it in shrink-wrap. Rather that the ethos of computing works best when it's small things first, big things last, rather than the other way round. Other media are fighting a losing battle on that front. Software doesn't have to.

JON MASTERS

The kernel column



Jon Masters is a Linux kernel hacker who has been working on Linux for some 18 years, since he first attended university at the age of 13. Jon lives in Cambridge, Massachusetts, and works for a large enterprise Linux vendor. He publishes a daily Linux kernel mailing list summary at **kernelpodcast.org**

Jon Masters summarises the latest happenings in the Linux kernel community, as preparations for the final release of Linux 3.12 near completion

Linus Torvalds announced the Linux 3.12 Release Candidate (RC) 6 kernel from the Portland, Oregon (PDX) airport saying, "I'm at PDX, about to fly out to the Kernel Summit, and it has almost become tradition to do an RC release using the airport Wi-Fi. So here it is…" Indeed, that PDX Wi-Fi has been used to ship a growing number of kernels over the years. As Linus noted, this was immediately prior to the 2013 Kernel Summit, in Edinburgh, and as a result many developers and maintainers were in transit (and not posting patches). Therefore it was not expected that there would be much more excitement left in 3.12. A good thing since there had been a little in the previous RC.

3.12-RC5 had contained a late-breaking workaround for a heretofore unnoticed compiler bug in GCC when using 'asm goto' statements (jumps contained within inline assembly code blocks). The actual problem was detected in code waiting to be merged into 3.13 (once its merge window opens, after 3.12 is released), but a quick hack fix was merged into 3.12 since it wasn't entirely obvious that the problem wasn't silently waiting to strike. A real fix to GCC is scheduled for the 4.8.1 release, and the kernel hack checks for this.

Cross renaming

Miklos Szeredi has proposed a new patch series in an RFC (Request For Comments) post to the Linux Kernel Mailing List (LKML) entitled 'cross rename'. The RFC adds support for a new system call named renameat2(), which is similar to the existing renameat() system call, but adds a flag argument. Using the new flag argument, it is possible to instruct the renameat() system call to atomically exchange two files in addition to simply renaming them – ie 'foo' and 'bar' are atomically swapped and point to the content formerly owned by the other.

The renameat2() system call exists to make life easier for union and overlay file systems as much as it does for simply exchanging two files. When a union file system is implemented, it creates a new virtual file system that appears to contain a combination of several others. In many cases (such as router devices, live file system USB sticks, and so on), the union file system combines a read-only file system with a small writeable one that contains additions as well as 'whiteouts'. The latter are file entries created to instruct the union file system to hide one of the underlying files that is supposed to have been deleted by the user. The renameat2() system call makes this particularly easy by allowing a whiteout entry to first be created and then atomically swapped in place on the union. Other interesting uses for cross rename are replacing a whole directory tree with a symbolic link, and other things that were not possible before.

linux-next

For many years now, Stephen Rothwell has prepared daily(!) 'linux-next' kernel trees (collections of source code patches) containing a combination of the individual developer trees from many different maintainers. In fact, at this point, getting new code into the kernel often requires that it has first had a soak in the -next tree for the previous kernel cycle. This ensures better QE and integration testing, and also ensures that developers are able to track what is coming down the pipe and how it may interact with other ongoing development work. Recently, and in conjunction with Kernel Summit, Stephen has been taking a (previously announced, and much deserved) three-week break from preparing his daily linux-next kernel trees.

Stephen hadn't anticipated anyone step in to provide coverage while he was away, but Thierry Reding did just that. Thierry is perhaps better known for his graphics-related work, but he has done a surprisingly awesome job at

"The renameat2() system call exists to make life easier for union and overlay file systems"

standing in for Stephen, resolving those ugly merge conflicts, fixing up patches and pulling in new trees for work under development. He has worked in collaboration with Mark Brown (who did a few days as well). It's nice to think that we could have continuity if core members of the kernel community were ever to leave, as occasionally has happened over time.

Ongoing development

Chris Metcalf (of Tilera fame) has posted a number of patches enabling virtualisation support for the Tile architecture. Perhaps most interesting is that the Tile KVM implementation actually provides a virtual machine that offers the same interfaces as the underlying hypervisor that is present on all Tile-based systems to begin with. In other words, no Tile kernel runs directly on the bare metal to begin with, but adding Linux virtualisation abstracts this abstraction still further!

A number of fixes to the UEFI code have gone into the kernel recently, in particular to unify the code between architectures that now use it (most recently, both 32-bit and 64-bit ARM have joined 64-bit x86 and Itanium) and reduce duplication. Other patches include a Runtime Services lock from Matt Fleming (the UEFI maintainer) which removes a few problems with the potential for reentrancy (calling an UEFI function twice at the same time from different parts of the kernel – that is not supported) by excluding it. Matt also merged support for 'earlyprintk' in the EFI code, allowing for very early debug without recourse to specialist hardware debuggers. On those systems using UEFI, the kernel will now support 'earlyprintk=efi' and use the EFI-provided interfaces for outputting text to the EFI console prior to the kernel assuming control over the I/O devices, such as the system serial port(s).

In this month's announcements, James Bottomley has posted on behalf of the Linux Plumbers Conference Steering Committee to say that the call for applications to become the next Plumbers planning team is now open. The chosen favourite location is Düsseldorf, Germany, colocated with the LinuxCon Europe event on the week of 13-17 October 2014, but they are willing to entertain strong candidate proposals for colocation with LinuxCon North America in Chicago on the week of 18-22 August 2014. Assuming Plumbers does take place in Germany, it will be the first time in Europe, and the first time that it has taken place outside of the United States.

Finally this month comes another first for the Linux kernel. Peter Anvin (aka 'hpa') posted a patch to the x86 'boot' code (the entry point uncompression code that unpacks a kernel image loaded by GRUB2 or another bootloader and actually loads the kernel entry-point). The actual patch wasn't important so much as the fact that it was entered using the keyboard on an Android mobile phone. As Ingo Molnar said in response, "it's probably a new Linux milestone, in a twisted, sick way". Let's hope for the sake of sanity that it doesn't become a norm!

How system calls work

System calls are the means by which user-space (non-kernel) code makes requests of the kernel. Typically, these are performed within the system C library (known as glibc, on most Linux systems not based upon Android, and Bionic in the case of Android) which is used by almost every program at the lowest level for such operations as memory allocation, opening, closing and manipulating files, and the like. A system call such as 'open' is used to open a file on the file system. An application calls a C-library-provided function having the same name, while the C library function performs the actual system call (by using a special hardware instruction to transfer into the kernel, passing the desired system call number as a parameter). The result of the system call is massaged by the C library and returned.

Some system calls have a one-to-one mapping in terms of the name of the C library function called by a program and the underlying system call; others do not. For example, there is no 'fork' system call in Linux (it is called 'clone' instead), but there are several C library functions that implement the various POSIX-compliant behaviour as if there were. Those all call into the real underlying clone system call instead. On those occasions when a modification is needed to an existing system call, the old one is not removed (this would break older applications), but instead, commonly, a new one is added with a similar name. Examples include dup() and dup2(), as well as the latest renameat2() system call.

Ubuntu Touch

A touch sensation?

Ubuntu for phones is now stable, so we take it for a spin and talk to Ubuntu mobile product manager at Canonical, Richard Collins

The release of Ubuntu 13.10 signifies a few things – such as some minor updates to the core OS and getting features out before the next LTS (Long Term Support) version. Most importantly, though, it means the first stable release of Ubuntu on phones, Canonical's next step in trying to dominate all computing platforms with Ubuntu. It's not even been a year since it was announced and while there's still some work to do and no dedicated hardware, it's amazing to see the OS come as far as it has.

A few days prior to the release, we spoke with Richard Collins at Canonical HQ in London about this major milestone, and the future of Ubuntu on phones. Collins is the product manager for Ubuntu mobile and has been working closely on Touch and other aspects of it since before its announcement.

As it's early days for the OS, there's still plenty of work to be done for it – and this also means in terms of creating an application ecosystem for the device. We'll show you how to get started developing apps for the phone OS, and how you can deploy them as well.

Ubuntu Touch

How Ubuntu on phones has shaped up, and what the future holds

FEATURE

A touch ahead

How Ubuntu on phones has shaped up, and what the future holds, as told by Richard Collins

"We had a couple areas of focus." began Collins. In his hand was a Nexus 4 running a slightly older build of Ubuntu Touch a couple of days before the 13.10 release. Over the past few months, development of the phone OS has progressed a lot, and he details some of the changes.

"We have a huge lift and shift in terms of the graphic capability – we've seen the introduction of our mir, a windows manager. That is such an important piece of the engineering work from which the base system optimisation is quite fundamental.

"That will deliver things in terms of improved overall performance, battery life, and resources. That's important to the application life cycle models. We've got background services running, and it means that multi-tasking is run very efficiently.

"It kind of underpins everything that is absolutely essential to making a smartphone function in the way it needs to. And so the emphasis right now in terms of the release is very much around perfectly optimising that system. That's a very important thing for hardware manufactures, because they want to be able to see the progress and benchmarking that's being made. It allows them to start to think seriously and take the next step towards hardware productisation."

Getting the partners interested in the OS is very important to the team, of course without it there wil be few avenues for the mobile OS to go.

"We've been listening very carefully and having lots of detailed discussions with out potential hardware and carrier partners, we understand exactly what role requirements they each have, and we have fed those requirements into our system design work, into our development work, generally in order to ensure that – as an OS – that it's ready to be hardware productised, the system capabilities, the fundamentals, etc. As I say the optimisation elements are there and available right now.

So this gives us a basis by which we can start to deliver more integrated range of services. Because the system is there now to support those services. We wouldn't have been able to do the services first and then the system, because then it would require a lot of re-engineering. We had to listen very carefully, particularly with our hardware partners, about what needs to be there. Because they want to

Richard Collins

Product Manager for Ubuntu Mobile, Collins oversees the team that develops the mobile version of Ubuntu. He also worked on Ubuntu for Android, the project allowing Android phones to launch a full Ubuntu OS via a dock.

The Edge would only have sped up current development

On the edge

While the Indiegogo campaign for the Edge broke a few crowd funding records, it still was unfortunately doomed to fail. With a lot of effort put into the device, did it affect the development of the core OS?

"Had it been successful, we'd have been able to take a very direct path towards productisation." Collins told us. "It would have run in a way that was parallel with the work that we're doing here. So there was never any question of us treating the Edge to as a lead device. We would have done it in parallel."

see a very well engineered platform, and that's what 13.10 is delivering for them."

With an eye to allow manufacturers to get it on any hardware, Touch is able to be deployed on any Android Board Support Package (BSP). The Android range of devices varies considerably in power though, so how does the OS handle that?

"The OS is entirely scalable." replied Collins. "If you're looking at very particular high end phone, then our proposition is based around this conversions to device, that means the hardware needs to store particular requirements built into it, such as sufficient amount of memory, CPU performance, make sure you have HDMI, etc. So the basis of where Ubuntu wants to go in terms of the high end is fundamentally built around this kind of conversion device, conversion to OS. And that implies a hardware manufacturer has to take on board certain requirements in order to build that hardware based product.

But we don't have to in any way adapt a version of the OS in a way to focus on a particular type of hardware product. The OS is entirely adaptable to basically meet different form factors, which includes tablets as well. We don't need if you like to make the OS modular – modularise the OS in any certain way. So things are not taken away or whatever, it's entirely adaptable."

Ubuntu has a strong community aspect though, and while getting hardware developers on board is important, the community has already been trying to port or create apps. A truncated list of these can be found on the Touch wiki, however that's not the only way to get them. We asked Collins if there was some form of app marketplace on the images.

"Yes, there is an app store built into it now, in the sense that you are able to use the SDK to build applications and developer can actually publish directly to their phone, their reference hardware." he told us. "We moderate the ones that come in and we make available a whole variety of applications in the standard image. This particular build doesn't show the full volume of different apps that are available. But nevertheless what's important in terms of where we've got to right now is the ability for developers to be very pro-active in terms of how they use their hardware, and they can see they can use it to develop their applications

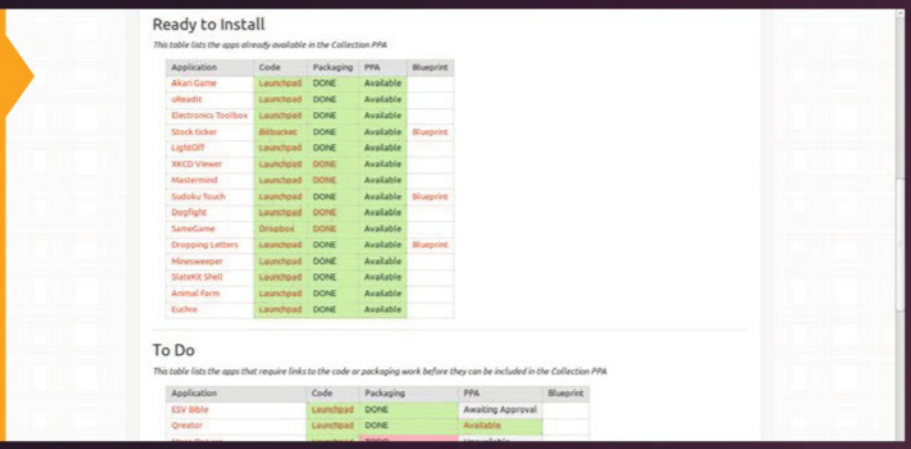
> **"The OS is entirely scalable, we don't have to adapt a version of the OS to focus on a particular type of hardware or product"**

You can already find a small selection of community apps online

Developing ambitions

Ubuntu 13.10 saw the proper introduction of Click packages, the method of deploying applications directly to the mobile version of the OS. This is a big step towards getting community involvement with the project, which Collins is excited about:

"You've got full access to systems and settings. The SDK for developers has evolved quite significantly as well, so this can now be used for application developers to actually build and actually publish their applications directly to the device."



and publish them directly. We can make those applications widely available as well."

There's a formal application process for developers to submit their apps, and after moderation they are sometimes included as a default app – some have already made it into the 13.10 build, although mostly games for now.

On the subject of apps and features, Collins told us that nothing had been dropped so far per se, mainly due to the way they're developing the OS:

"We've got a very aggressive development plan, which is going to take us all the way through. Just because we're making these announcements right now about 13.10, it doesn't mean that we slow down or compromise in any way. We still have some work to do in terms of taking onboard the requirements from our hardware partners and the operators that form part of our carrier advisory group and there are particular things that are very specific to a carrier. For example, this might be CDMA, that's something that needs to feed in as a requirement that we need to support...there's lots of work to do in terms of making sure that the OS will quickly evolve into something productisable for our partners."

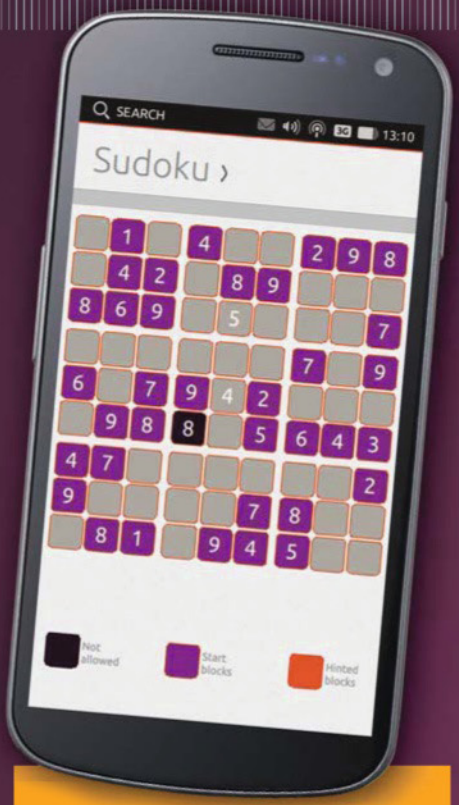
Now with the 13.10 release out the way, what's next for the mobile development team?

"There's still a long list of things we will be working on, and we're very well engaged with taking requirements from operators and somewhat working through those right now. That will feed a priority set that will mean the developer work will continue to run at quite a fast pace. We have a number of internal milestones that we want to achieve. At this stage we have the basis of something, which hardware partners will now look at seriously and work out how to productise it.

The example I was giving before in the context of maybe Android hardware, in order to go beyond that and start to establish a very strong competitive position we have more work to do particularly in terms of thinking about new hardware designs that it would work on. That carries a lot of requirements that need to feed into product developments."

"We still have a very ambitious development plan" Collins finished off.

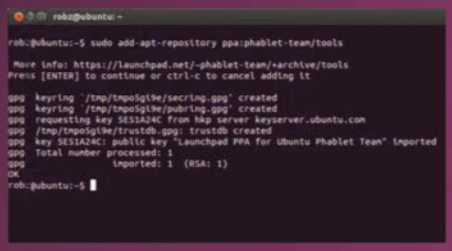
"There's a formal application process for developers to submit their apps, and after moderation they are sometimes included as a default app"



Install Ubuntu

Here's how to put Ubuntu on a Nexus 4 or Galaxy Nexus...

On The Disc



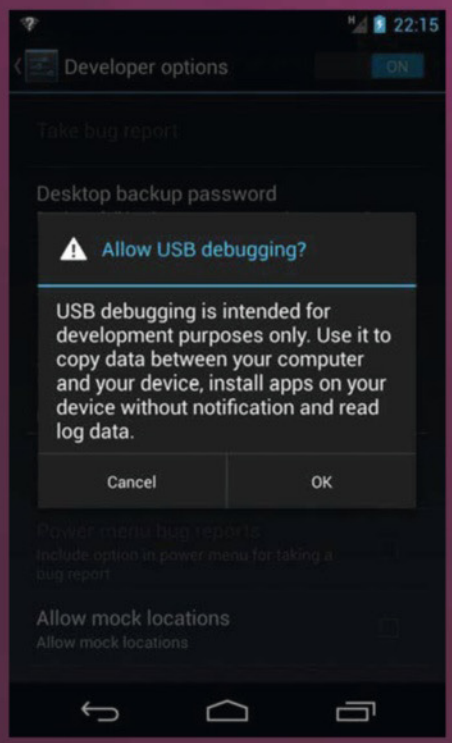
01 Initial setup

You'll need Ubuntu 12.04 or later to install the phone OS. First of all, add the repo with:

```
$ sudo add-apt-repository ppa:phablet-team/tools
```

Update the repositories, and then install the necessary software with:

```
$ sudo apt-get install phablet-tools android-tools-adb android-tools-fastboot
```



02 Backup

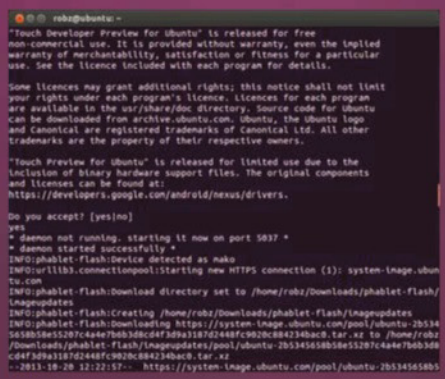
We'll need to wipe the phone to put Ubuntu on it; there's no dual booting for now. Go to developer options and enable USB debugging. Developer options can be unlocked by tapping on 'Build number' seven times. Plug your phone in and use `$ adb backup -apk -shared -all`

03 Unlock phone

You'll need to unlock your phone if you haven't already, and this will wipe it. If you haven't done that, reboot the device into the bootloader by using power and volume-down. Make sure it's still plugged in, and at the terminal type `$ sudo fastboot oem unlock`

04 Final checks

If you've had to unlock the bootloader, you'll need to activate developer options and USB debugging again. Make sure your phone is plugged into your computer and make a note of the build number of your phone so that you can restore it later.



05 Install

We're now ready to install. Open up the terminal and type:

```
$ phablet-flash ubuntu-system -no-backup
```

This will reboot the phone into the bootloader, download and push the image to the device, and then install it. This process will take a while.

Sense of community

There are some nice apps already on Ubuntu Touch, some of which come from the community

Sudoku Touch

A simple sudoku game that's been made for Ubuntu Touch, with a smart puzzle-creating algorithm and a very fair hint system. The interface for it is very friendly and has been decked out in Ubuntu colours of orange, purple and really dark purple.

Dropping Letters

This community-developed game involves finding words in the game area as letters drop from the top of the screen. Words need to be spelled out before one of the columns gets to the top of the screen, allowing for more letters to drop.

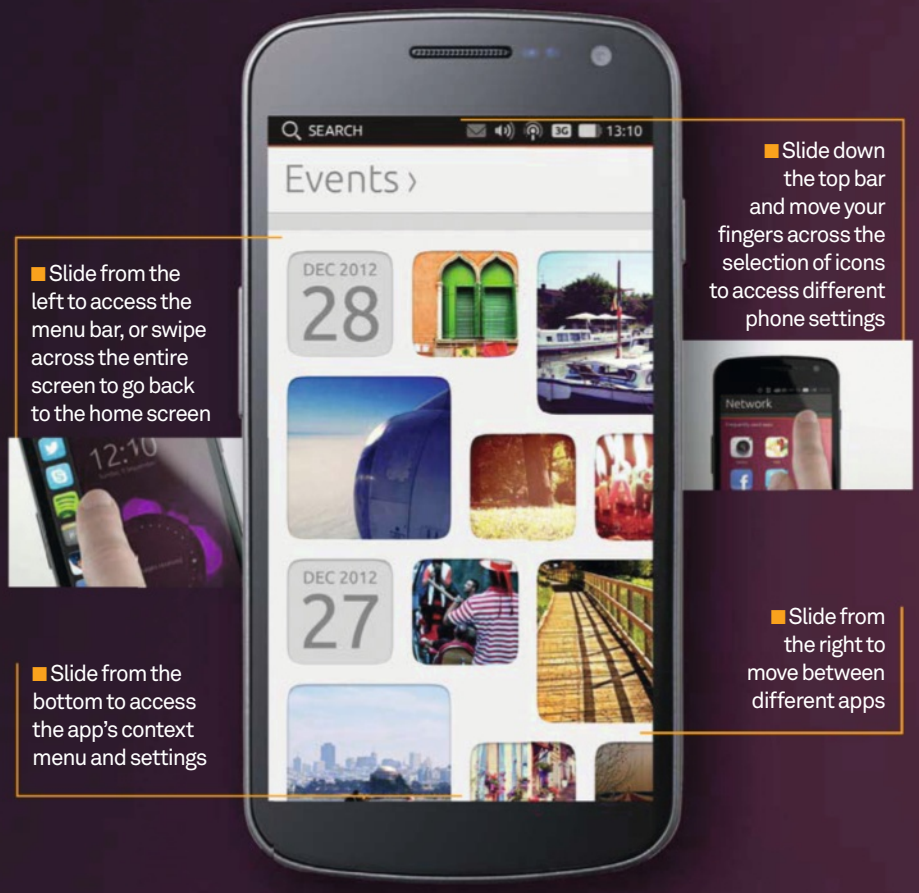
Stock ticker

A must-have for business-minded people, this stock ticker app is ported from Ubuntu and shows share prices for the companies you're interested in, along with graphs to visualise the trends each stock is taking. It will update live as well, as long as you have an internet connection.

Quick-start guide

Get a head start with Ubuntu Touch with these tips and tricks

A brand new phone OS means there's a lot to see, and a lot to get used to. While some basics such as the edge swiping and navigation are fairly straightforward, there are some sections of the OS that need a little more know-how to get working – especially if you want to make the most of it, or just have access to all the functions of your phone. We've rounded up some of the important bits you should know before setting up your development device.



Updates

As Touch is continually updated, you too will need to keep your phone or other device up to date with the latest Ubuntu and its packages. As well as reflashing the device, which you will probably be doing anyway, the latest image includes an Update utility. Swipe over to the Applications scope, press on the Installed Apps submenu to expand it, and select it from the list. It will automatically check for updates if you want it to, or you can do it manually. This app also shows the space usage on the device, much like the disk utility apps on the desktop Ubuntu.

Using ADB to transfer files

ADB is the Android Debug Bridge – a simple but versatile command-line tool that allows you to communicate with an Android device. Ubuntu Touch uses this initially to back up your phone, then put the image files onto the storage so you can install the OS. It can also be used to transfer files between a host computer and the device using the **push** and **pull** commands. To put files on the device, use:

```
$ adb push [file to send] [location to send it]
```

...and to retrieve:

```
$ adb pull [file to take] [location to sent it]
```

If you're connected on the same network, you can also use SSH.

Setting Wi-Fi

While wireless networking is supported on the Nexus 4 and Galaxy Nexus, connecting to it is not like using the simple UI of an Android device. The only option in the Wi-Fi settings is to connect to saved networks, and you cannot create these network settings in here. To connect, find the terminal application in the full list of apps. Open this up and type in:

```
$ nmcli -pretty dev wifi connect [network-name] password [password]
```

This should connect to the Wi-Fi network for you, otherwise you'll need to copy over another device's connection settings.

Restoring Android

You can easily restore Android to your device once you've finishing trying out Ubuntu. In our installation steps we mentioned to note down your build number – it's important to install the exact same build to your phone if you want to restore the backed-up information as well. From the Google developer page, download the image you require, plug your phone in, and **cd** to the image directory in a terminal. Now reboot to the bootloader with:

```
$ adb reboot-bootloader
```

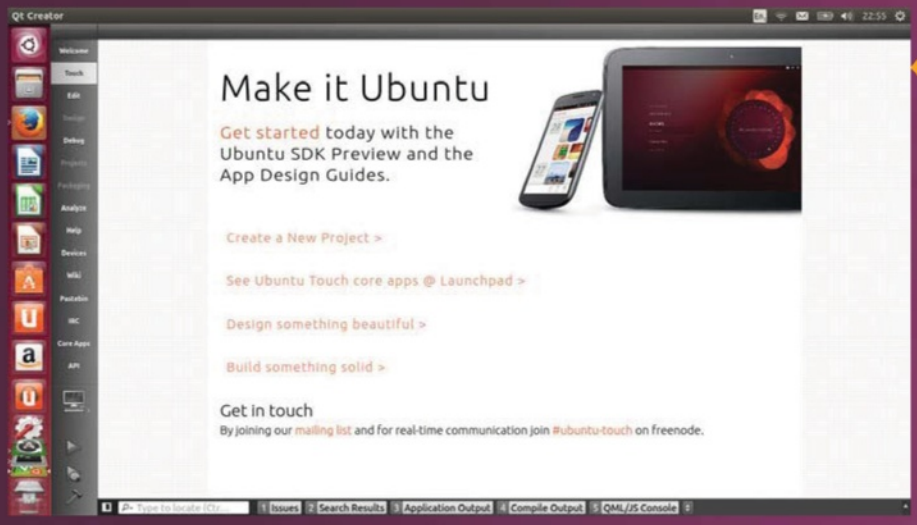
Then follow this with:

```
$ run./flash-all.sh
```

...to flash Android back onto the device.

Get developing

Contribute to the next phone revolution and your app might even be included with every Ubuntu phone



Why Qt?

Qt Creator is used for development and deployment right now due to QML, but Collins tells us it's more of a recommendation:

"The SDK that we – as an organisation that's always been very involved with application development – have developed can be used on a number of IDEs that people can use on Ubuntu. However, for the Ubuntu running on smartphones, the Touch interface, the particular SDK we suggest is based on the Qt Creator IDE."

Hello QML!

Say hello on Ubuntu mobile with our basic 'Hello World' code:

```
import QtQuick 2.0
import Ubuntu.Components 0.1

MainView {
    id: root
    objectName: "mainView"
    applicationName: "HelloWorld"

    width: units.gu(100)
    height: units.gu(75)

    property real margins: units.gu(2)
    property real buttonWidth: units.gu(9)

    Page {
        title: i18n.tr("Hello World!")

    }
}
```

Templates make it easy to get started

Development for Ubuntu on phones can be done in many ways – either using a pure HTML5 web app, or a more traditional application using QML. The Ubuntu QML toolkit is one of the main SDK's to develop for the phone, and Collins tells us that's what they suggest at Canonical. This works with Qt Creator, part of the Qt development framework. To get started, go to the Ubuntu Developer site at **developer.ubuntu.com** and follow the links to install Qt 5, the QML toolkit/SDK and Qt Creator.

Create your app

Once it's all installed, launch the Ubuntu SDK and start a new project. From here you can select a 'Simple Touch UI' template from the Ubuntu projects, which will get you started right away with development of a phone app. You can test your packages with **Ctrl+Alt+R**.

Use it on a phone

When you're happy with what you've created, you then need to package it as a Click app. To do this, open the project in the Ubuntu SDK. On the column along the side is a tab called Packaging. Open that and fill out the form with some of the basic details. You also need to make sure you choose what security policies the app requires.

Packaging for Click only needs a small amount of information

Publish it to Ubuntu

From here, your app can be pushed to your phone and used as you wish. Otherwise, you can go through the formal application process to send it to Canonical; it will then be moderated and added into the standard image if it's deemed successful.

Ubuntu apps have their own style guide for certain parts of the interface. The development website lists all of these, along with some simple tutorials to give you some clues on how the Touch apps are put together. As the Touch OS develops, it will be needing more apps, so getting on the development train early is a great way to get your applications out and onto the OS as a default package.

One of the scopes, named after the desktop equivalent, and can be moved between with swipes on the edges of the phone

Ubuntu can easily access all a phones hardware functionality, such as GPS and Bluetooth connectivity

A core selection of apps are available, including some community ones

PHONE OS

Ubuntu Touch

How does version 1.0 of Ubuntu's mobile OS perform, and does it have the potential to take on Anadroid and iOS? We load it onto some phones to find out...

Pros
Completely gesture based control scheme allows for maximum screen real estate, and all basic phone features are available

Cons
Very buggy still, with lock screen issues, crashes and UX problems with some of the core functions

The term stable carries some specific meaning in the world of Linux, and indeed just development in general. It implies something is, at least, functionally complete, and when October 17th was announced as the date of the Ubuntu phone OS's stable release, some people were surprised. Canonical is a big company though, and development hasn't had to slow down due to life problems or exams. Unfortunately though, this so-called stable release is anything but.

Canonical lists the functions that should be available after install as the shell and core applications, mobile data, phone and text functionality, networking, camera support and accessibility to devices over ADB. All fair enough – it's early days for the OS. Extra packages and applications can be added via Click, although all the best ones are already installed. The installation process has become very simple over the past few months as well, requiring no more than a phone and a system running Ubuntu. It's easier than putting most custom Android ROMs onto a phone, so you don't need to be extremely patient to check it out or get a reference device sorted.

The main problem with Ubuntu Touch right now though is that it's just incredibly buggy. The screen won't lock properly, and when it does you can't wake it. If you swipe across screens at the wrong time, you crash the device, requiring a hard reboot. While the display and keyboard will flip to landscape when you rotate the phone, the keyboard keys will only work in the area that the portrait keyboard would inhabit. If it was just usability or UX problems, of which there are several, then it could be forgiven for having the stable tag. Unfortunately though, it's basically broken right now.

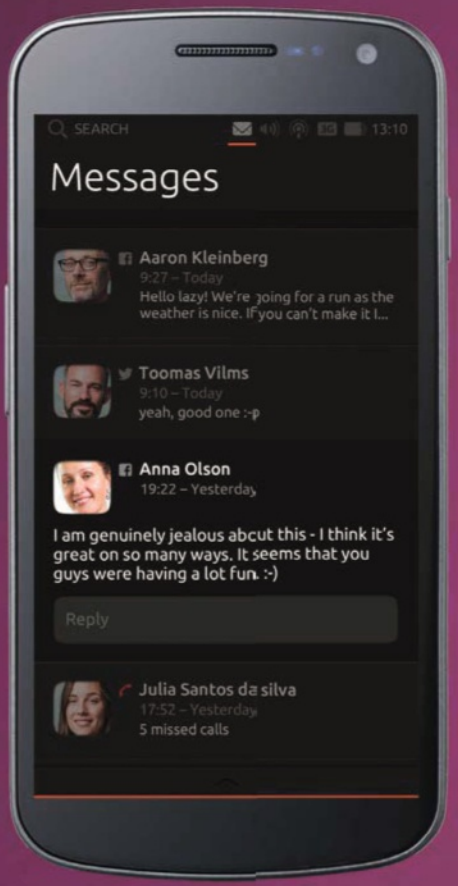
While all of this means you shouldn't be using it as your main phone OS and having to wrestle with a few bugs, it doesn't mean there aren't some positive points to the OS. The main

Ubuntu Touch

How does it perform, and can it take on Android and iOS?

REVIEW

The lock screen is more dynamic now – however devices won't always properly wake to see it



The OS has full access to mobile data and call services, and that's also open to developers

interface hook for Ubuntu on phones is the way edges are used to navigate the entire system. Instead of ever-present soft or hardware buttons, you merely swipe to the side or from the top or bottom to perform different actions. While before these were very rough and implemented mainly to show off the function, this has been refined a fair amount. Corners no longer cause a significant problem to the gestures, and learning the quirks of performing the swipes correctly is right at the same kind of level of getting used to any new interface.

The keyboard, for its orientation issues, works quite well. After years of people moaning about early Android keyboards, the Ubuntu touch keyboard is at a standard of most modern touch keyboards. The only thing its missing is a dictionary and auto-correct, but typing is generally fine. For some, this is a major challenge for newcomers to the mobile market, and it's great to see how well it works at the moment.

The basic app selection is passable, although a lot of the high-profile brand apps are merely shortcuts to their websites right now – something we're a little disappointed at after being told some of these apps would be native. There are a couple of games in the build though that come from the community, a sign of things to come if more people start developing for it.

Some stuff still has more work to be done on it. The Wifi is the best example – it works, and it will connect to a Wifi network, but you need to set the connection manually through the phone's terminal. After that, you can SSH in and start performing other tasks from a system with a better terminal emulator and keyboard, but it seems odd that there's no simple Wifi connection UI. Apps on the home screen, when tapped, then bring up another dialogue with information then asking you if you want to launch it, a strange way to modify the workflow.

This really sums up the user experience for the OS right now – all basic functionality works, even if the way it functions is slightly off. If it wasn't for the horrific bugs that make it unusable day-to-day, it would be good enough to use for an internet connected phone as the browser is not bad at all. Unfortunately, there's a lot of work to be done, and potential should never be a deciding factor on whether or not you use something so integral to daily life.

Rob Zwetsloot

Compatible devices

Currently, Ubuntu on phones is recommended for the Galaxy Nexus and Nexus 4, the then most recent flagship Android devices. The aim is to have Ubuntu deployable to all hardware with an Android Board Support Package (BSP), but at the very least for now you can also put it on the original Nexus 7 according to Collins:

"The [Nexus 7] is very well aligned with smart phone, while the [Nexus 10] has a lot more functionality, so in terms of the time frame for 13.10, progress won't be as evident. The focus on this release is more about the phone"

Summary

While it is for developers only, the stable tag for this release should have meant much more than it did. Touch right now is a buggy mess that is not suitable as your main phone OS. Bugs aside, it's definitely looking more like an actual phone OS now and not just smoke and mirrors.

More information

ubuntu.com/phone

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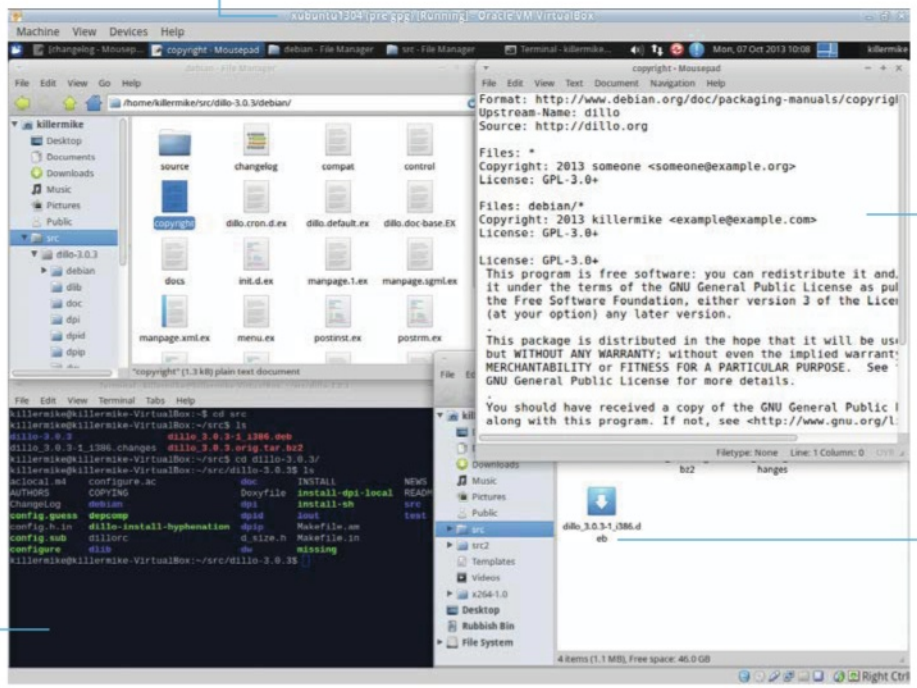
We recommend that you carry out this tutorial inside a virtual machine rather than on real hardware



Whether building RPMs or Debian packages, the configuration consists of editing some text files

The actual building of packages takes place from the command line, as does much of the setup

The finished product, a DEB file that can be installed on Debian-derived distros

Make your own DEB and RPM packages

We'll show you how to manufacture the two most common types of Linux package for software distribution so you can become your own package maintainer

Advisor

Michael Reed is a technology journalist and he's been hacking away at Linux for over 15 years

Resources

Ubuntu & Fedora installation (or VM)

We're going to take you through the process of making software packages for the two most popular packing systems, DEB and RPM. You can use these techniques to package your own software or even to become a package maintainer for software projects that you feel are being overlooked.

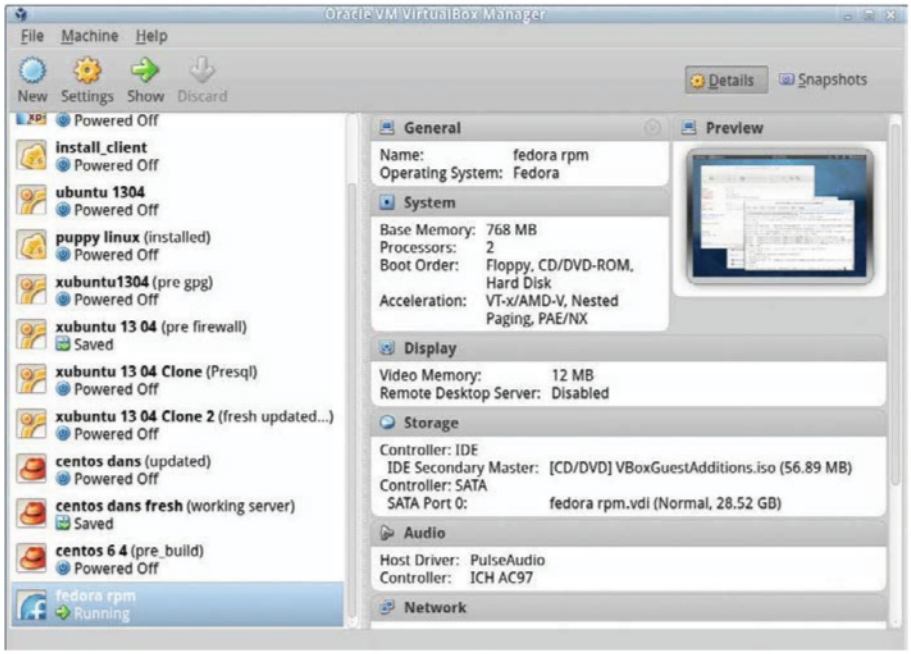
We'll start with a guide to building DEB (.deb) files for Debian-derived distributions – we're using Xubuntu as our base for that. Following that, we'll detail the methods needed for the creation of RPM packages for use on Red Hat-derived distributions, and we'll use Fedora for that. You can often create a package on one distribution and then install it on a related one (Ubuntu>Debian, for example), but it might be worth testing it yourself, if this is crucial.

As for the software, we're going to use Dillo, a lightweight web browser, as an example package to build from source code. As is often the case when building from source, you may have to look around on the web for solutions if the build doesn't go as it should. For example, in the case of Dillo 3.0.3, we had to add 'LIBS=-lX11' to the front of the build commands to get it work, due to an oversight in the source code archive.

Make your own DEB and RPM packages

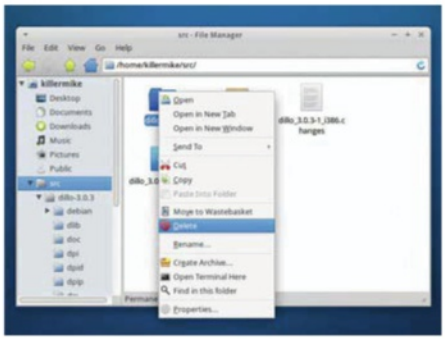
How to create the two most common types of Linux package

TUTORIAL



01 Employ a virtual machine

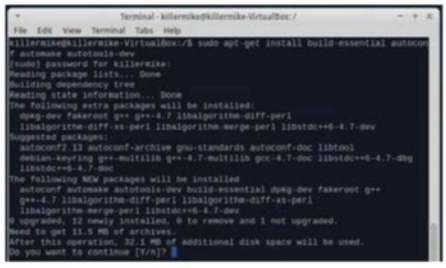
Using a virtualiser such as VirtualBox or VMware is often the best approach to building packages for other systems. For one thing, it allows you to maintain a relatively clean, reference installation that is comparable to a setup that other people are likely to be running. This also means that you can keep a selection of target environments, using a different distributions. In addition, most virtualisation products allow the emulation of different architectures, and this can even extend to running a 64-bit OS on a 32-bit platform, although performance will suffer.



02 Starting from scratch

If things go wrong, with Ubuntu or Fedora, it is perfectly safe to simply delete the source directory and start again. Note that the Debian tools do alter the source archive, so you'll have to start with a fresh copy.

Part 1: Debian



03 Install build environment

We'll start by installing most of the tools that we need for to make software from source code. Type:

```
sudo apt-get install build-essential autoconf automake autotools-dev
```

Now we have to install tools that are used for handling DEB packages. Do this with the following command...

```
sudo apt-get install dh-make debhelper devscripts fakeroot xutils lintian pbuilder
```

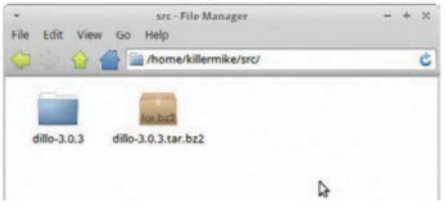
04 Create a GPG key

If you haven't created a created a public GPG key in the past, you must create one now so that you can sign packages. Start by typing `gpg --gen-key`. Accept the default settings, and fill in your real name and contact details when prompted. Make a note of these details, as we need an exact match for a later configuration file. Following this, type `ls ~/.gnupg` to make sure the new key exists (it's firstname_lastname.gpg). Create a public key from this with:

```
gpg -a --output ~/.gnupg/[your key].gpg --export '[your name]'. Import this with gpg --import ~/.gnupg/[your key].gpg
```

05 Fetch package

In this example, we're going to fetch and build the latest version of the Dillo web browser. Navigate to the Dillo website (**www.dillo.org**) and download the most recent .tar.bz tarball. Create a directory for source code with `mkdir ~/src` and move the archive into it.



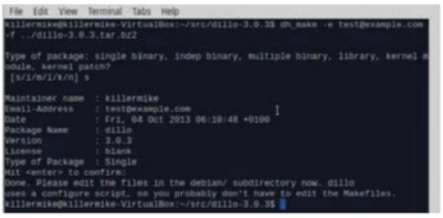
06 Unpack the archive

Unpack the archive with `tar -xjvf [archive name].tar.bz2`. Note that the naming convention of the directory (**package name-version**) is crucial for our purposes, and fortunately Dillo complies with this. It's also crucial that the source archive is one level above the source directory.

07 Add Debian compliance

Move into the directory that we have just unpacked with `cd`. **dh_make** is a script that takes care of much of work of adding the configuration file and directory structure that we need, and it's part of the debhelper suite that we added earlier.

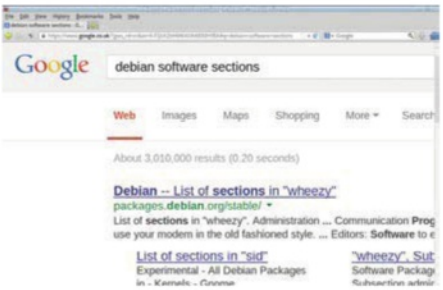
```
dh_make -e [your email address] -c licence -f ../[source archive]
```



In our example, the command line is:

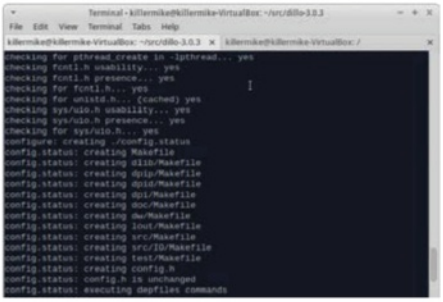
```
dh_make -c gpl3 -e example@example.com -f ../dillo-3.0.3.tar.bz2
```

When prompted, select **single binary**. The helper script should have created a directory called Debian within the source code directory.



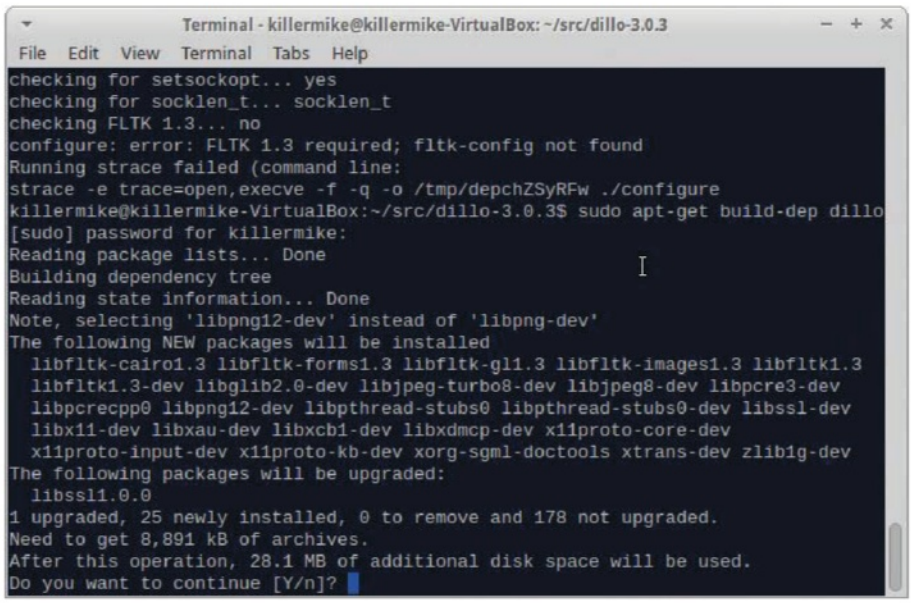
08 Open the control file

Open the file **control** in the **debian** subdirectory in a text editor. Fill in the **homepage section** (Google for complete list of Debian software sections) and **description** fields of this file.



09 Discover dependencies

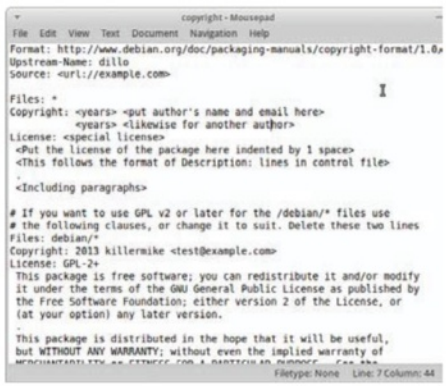
You can discover the dependencies needed to run the software in the package by moving into the source directory and typing `dpkg-depcheck -d ./configure` into a terminal. Doing this may produce errors that indicate that a package needed in order to build the software (a separate issue) is missing. You can discover these packages by typing `sudo apt-get build-dep [name of package]`, and this should help if there is some support for this software in the repository of the distribution. If not, you'll have to repeatedly run `dpkg-depcheck -d ./configure` and add packages manually by typing `sudo apt-get install [name of package]`.



> **If everything is set up correctly, we can finally build the DEB**

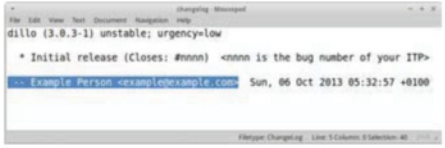
10 Add dependencies to the control file

When the command from the previous step has completed, it should present you with a list under the **packages needed** heading. Add this list of dependencies to the **depends:** section of the control file. Each item on the list must be separated by a comma and a space.



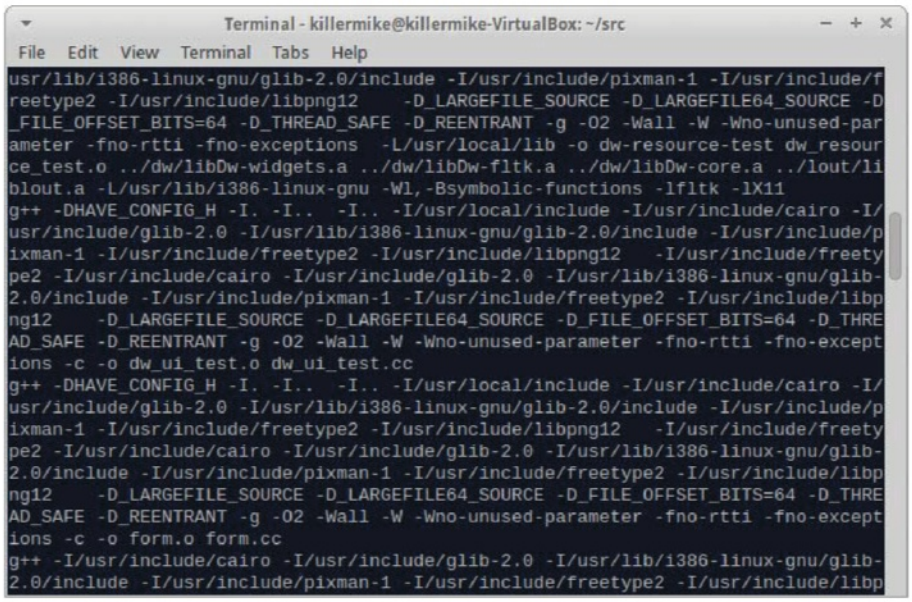
11 Edit the copyright file

Try to complete this step as comprehensively as you can, and don't skip it. **Source:** is usually the homepage of the project. Within the **Files: *** section, replace the copyright information with the names of the authors of the project. You can see the required format for this by examining the **Files: debian/*** section, which should have your details in it. You may have to do a bit of detective work to find the information you need. Look for files such as **AUTHORS** and **COPYING** within the source directory.



12 Edit the changelog file

Open the **changelog** file and make sure that the name and email address match those that you entered when creating your GPG key. Typically, the helper script may have added your username rather than your real name to the file. As with the copyright file, don't skip over

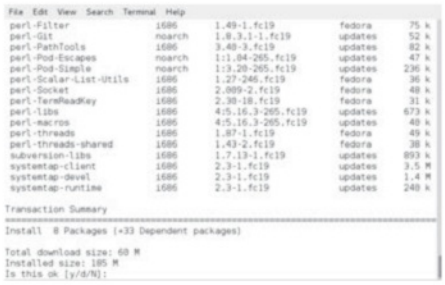


this section as doing so may halt the packaging process or lead to a non-compliant package.

13 Edit the changelog file

If everything is set up correctly, we can finally build the DEB. Move into the source directory and type `dpkg-buildpackage -b` to build the package, which is deposited in the `~/src/` directory. Example package by typing `dpkg -I [package]`. Run Lintian on it with `lintian [package]` to check for Debian policy compliance. Note that this tool is notoriously strict and it's up to you to decide if you can live with some minor non-compliance warnings. Finally, install it with `sudo dpgk -i [package]`.

Part 2: Creating RPMs with Fedora

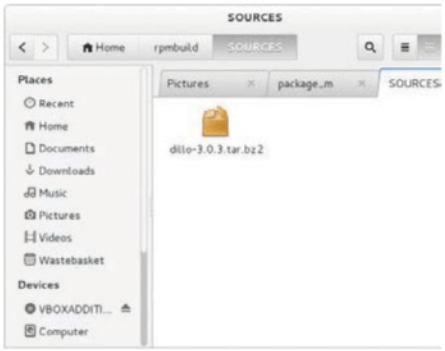


14 Open the control file

Become root by typing `su`. Begin with `yum groupinstall "Development Tools"`, and follow this up with `yum install gcc-c++ fedora-packager`. Type `usermod -a -G mock <your username>` to add your user to the **mock** group. This allows us to carry out the build procedure without needing to run as root.

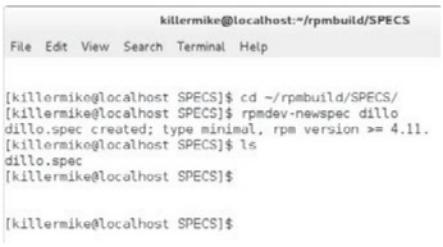
15 Create build environment

Press **Ctrl+D** to log out of root. Type `rpmdev-setuptree` to create the directory tree (under **~/rpmbuild**) that we need.



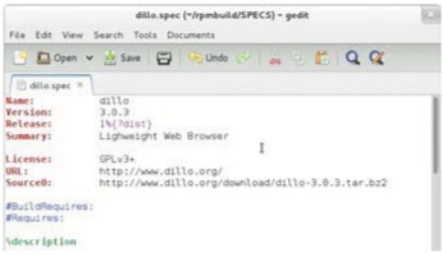
16 Fetch the archive and move it

Download Dillo from the Dillo website and move the archive into the into the proper directory by typing `mv [name of archive] ~/rpmbuild/SOURCES`.



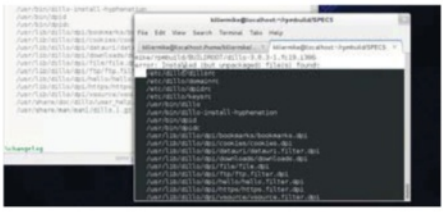
17 Create .spec file

Red Hat derived distros such as Fedora use **.spec** files to specify the build process. Move into the directory that contains these files with `cd ~/rpmbuild/SPECS/` and create a blank .spec file by typing `rpmdev-newspec dillo`.



18 Edit .spec file

Type `gedit dillo.spec`. Fill in the **Version**, **Summary** and **Licence** (GPLv3+ in this case) fields. **URL** is the project homepage; **Source0** is the URL of the source code there. Comment out **BuildRequires** and **Requires**. Add a full description in the **%description** area.



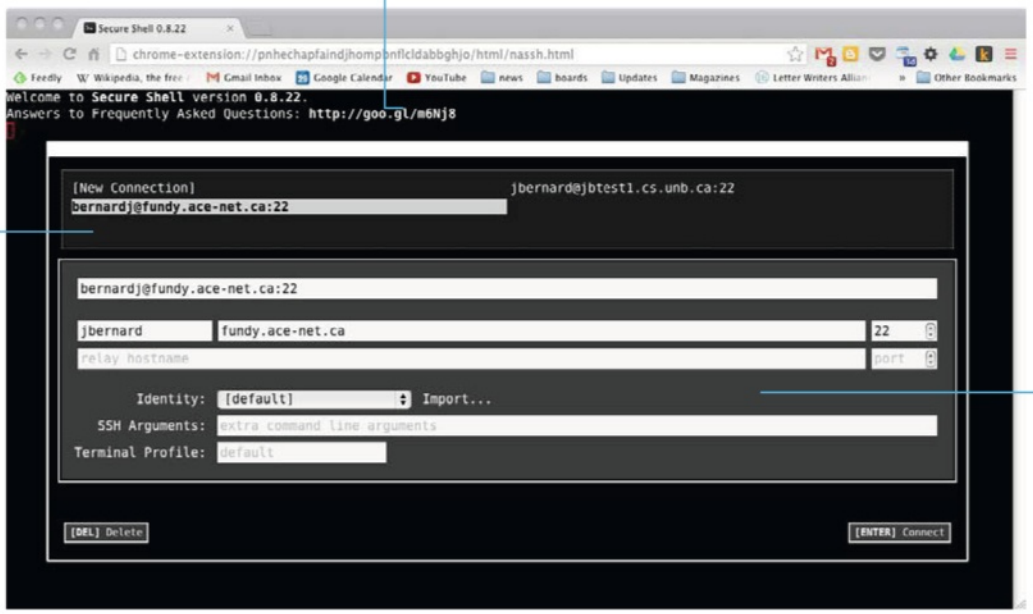
19 Build source code

If the package is supported at all in the system, run `yum-builddep [name of package]`. Otherwise, you'll have to repeat the build command to generate errors or search the documentation in the source archive. In the **SPEC** directory, type `rpmbuild -ba [name of package].spec`. If this build fails and reports about extra, unpackaged files, cut and paste this list of files into the **%files** section of the .spec file and repeat the build command. The package is now in the **RPMS** directory. Type `rpm -ivh [package]` to install it. Type `rpm -qa | grep [package]` to make sure that it is installed.

Here you can find a list of all of the previous connections you made through Secure Shell in Chrome

There is a URL always available pointing you to a goo.gl URL containing an FAQ for Secure Shell

For a given connection, you can set the hostname, the username and any other SSH options you need



SSH from a web browser

There are times when you are stuck using a locked-down machine. As long as you have a browser, though, you can still connect to your remote machines. Here's how...

Advisor

Joey Bernard As a true renaissance man, he splits his time between building furniture, helping researchers with scientific computing problems and writing Android apps

Resources

Secure Shell: goo.gl/RYHiK

FireSSH: firessh.net

Shellinabox: https://code.google.com/p/shellinabox/

MindTerm: www.cryptzone.com/products/mindterm/

DropPages: droppages.com

Pancake: pancake.io

SSH is the de facto way of securely connecting to remote machines where you need to get work done. Normally, this is achieved through an SSH client application installed on your desktop. Unfortunately, there are situations where this is just not feasible, for any number of reasons. In this tutorial we will look at a few different options for how to regain a command-line connection to your remote machines.

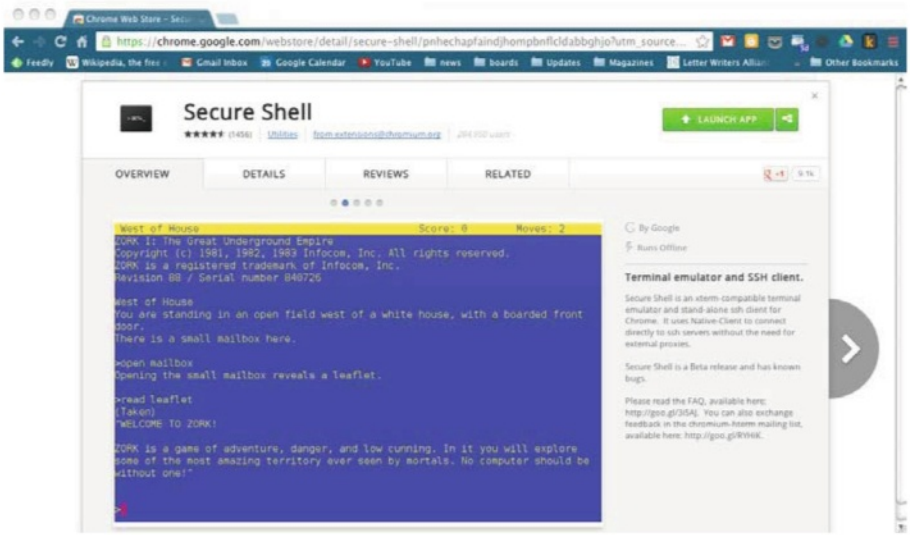
No matter how locked down a machine may be, you will almost always have a web browser available. We can leverage this and get an SSH connection established through this browser. There are several different technologies that can be used to give us this connection. The first option we will look at is a purely browser-based application that requires nothing extra on either the client side or the server side. Naturally, the available options are limited, but it is one of the leanest options. The issue is that you need to use a supported browser. The second option is a Java-based one. A Java applet is loaded into your browser to handle the actual SSH connection management. Unfortunately, this is only an option if you have Java installed and are allowed to run Java applets in the browser. The third option is even leaner on the client side than the first option, and has the added advantage of running in almost any browser. The downside is that it requires you to install a piece of server-side code to facilitate the actual SSH connection management.

Hopefully, by the end of this tutorial, you will have found an option that fits your situation and helps you manage your remote machines no matter where you are.

SSH from a web browser

Three browser-based ways to connect to your remote machines

TUTORIAL



01 Finding an SSH client plug-in

Both Chrome and Firefox have SSH clients in their respective app stores. In this tutorial, we will be looking at **Secure Shell** from the Chrome store and **FireSSH** from the Firefox store.

02 Installation

In the case of both browsers, installation should be straightforward. All you need to do is find the relevant app in the browser store and click on the Install button. Most browsers also require a restart before the SSH client is ready to use.

03 Open a new connection

For the rest of this tutorial, we will use the Chrome version. To open a new connection, simply click on the 'Secure Shell' icon on the browser homepage. This will open up a connection window where you can enter the host, username and password.

04 Terminal options

'Secure Shell' in Chrome does not have a terminal preferences window yet, so you need to open a JavaScript console (by clicking the menu item **View>Developer>JavaScript Console**) and entering the changes you want to make. For example, you can set the background colour with the following:

```
term_.prefs_.set('background-color', 'wheat')
```

05 Working in SSH

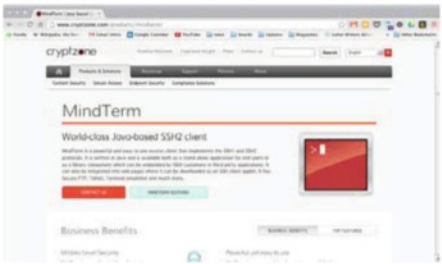
You can do almost everything with 'Secure Shell' that you would normally do with a regular client. You can do port forwarding by including the relevant options when you make the original connection. You place these types of options in the **SSH Arguments** box.

06 Closing connections

You close your connection the same way you would with any other SSH client, by typing in **exit**. When the connection closes, 'Secure Shell' offers you the option to reconnect (R), choose another connection (C), or simply finish and exit (x). If you choose 'x', the current browser window will stay open but will be inactive.

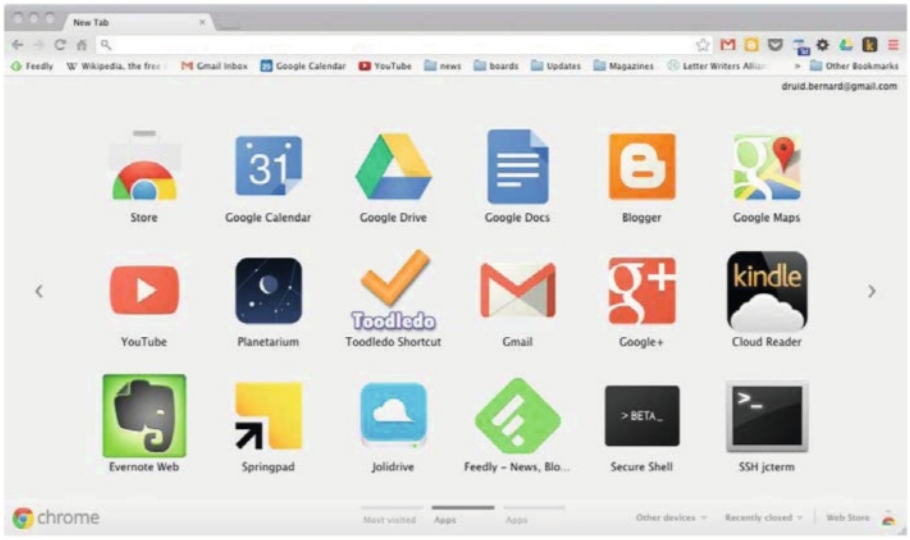
07 Saving connections

All of your previous connections get stored as a list that becomes available at the top of the connection screen. Clicking on one of these stored connections lets you edit the SSH options before firing off and connecting to the remote machine.



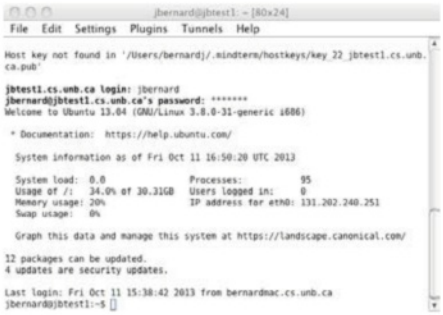
08 Finding a Java plug-in client

There is a Java applet that you can use called **MindTerm**. In this case, you need to wrap MindTerm in a simple webpage in order to get the browser to load it for you and host it somewhere visible. You can also run it directly as a Java app.



09 Installation

If you need to host MindTerm somewhere non-local, you can place it on a hosting service if you have one. If not, you can get a Dropbox account and host it there as a static webpage. There are services like **droppages.com** or **pancake.io** that will help you here.



10 Open a new connection

The screenshot above is made using the MindTerm jar file standalone. The behaviour is the same in the browser. When it starts up, it asks you to enter either a server alias or a server hostname. If this is a new machine, it will ask you whether you want to save it as an alias.

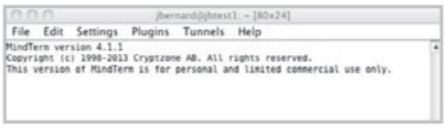
11 Connection options

The advantage of a Java applet is that you have more tools available to you. Clicking on the menu item **Settings>Terminal...** will pop up a full preferences window where you can set the terminal type, font type and size, and colours, among other items.

12 Working in SSH

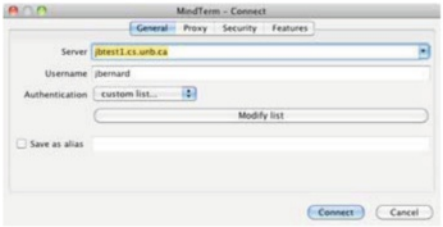
With MindTerm, you also have easy access to all of the SSH connection options. Clicking on the menu item **Settings>Connection...** will pop up a new window where you can set port forwarding, as well as more esoteric items such as the type of cipher or the type of compression to use.

> **You can do almost everything with 'Secure Shell' that you would normally do with a regular client**



13 Closing connections

You close your session with the **exit** command, just like with a regular SSH client. Once the connection is shut down, MindTerm resets itself and is ready for a new connection to a new host.

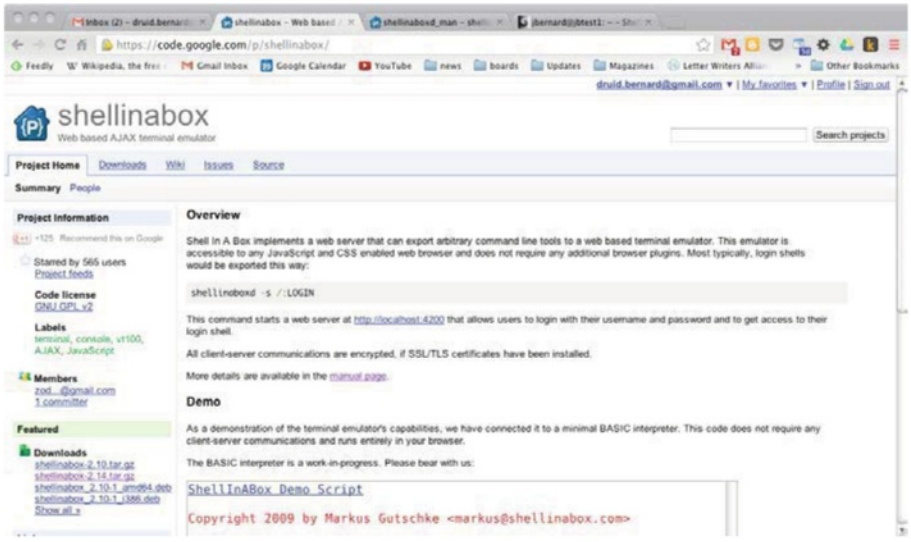


14 Saving connections

Whenever you connect to a new host, MindTerm asks you whether you want to save it in the list of hosts under an optional alias. To get access to these saved connections, you will need to click on the menu item **File>Connect...**. This will pop up a connection window where you can select the server from a drop-down box.

15 Client/server browser-based SSH

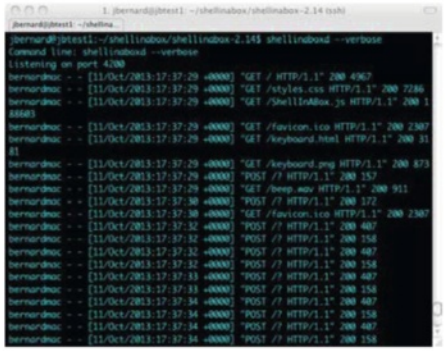
The previous two methods have an advantage where all of the SSH connections are essentially only through the client and the server. This also means that the machine you are working on also needs to allow network connections on the ports that you need, most often port 22. But what can you do if your desktop is locked down to only allowing HTTP traffic? In this case, you need to move the



workhorse part of your SSH connection off to another machine, and connect to it over HTTP with your browser. The most common choice for this is **shellinabox**.

16 Installation

Once you download the source, you need to install it with the usual `./configure; ./make; ./make install` step that should be in most Linux users' repertoire of skills. You do this on the remote host that you want to connect to.

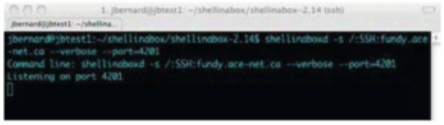


17 Starting the server

Once shellinabox is installed, starting it is done by simply starting up **shellinaboxd** on the remote host. There are tons of options available as command-line parameters. The most common ones are options like **--port=x**, and **--verbose**.

18 Starting the client

To start the client, you simply need to open your browser and enter the URL to the remote machine. It will look like **http://mymachine.com:4200**, where you might have changed the port being used. This will open up a terminal where you can enter your username and password.



19 Connecting to a different machine

Once you log in, you can always just SSH to another machine. But if this is something that you always do, you can get shellinabox to do this for you by using the option **-s /:SSH:mynewhost.com**. This means you could have connection tunnels to multiple different machines, each with its own port.

20 Connection options

Because this is the leanest of the web-based SSH clients available, you simply don't have the same level of configuration options.

Right-clicking in the terminal window will bring up a set of options that get saved in a web cookie that survives over sessions.

21 Working with SSH

Unlike the other methods, you do not have the option to set up more complicated options, like SSH tunnelling. All you get on the client side is pure HTML, with nothing else. If you need more, you will need to use one of the other methods.

22 Closing connections

Like every other SSH client, you shut down your connection with the **exit** command. This leaves your browser window open with a button popping up in the centre labelled **Connect**. Clicking on this button will refresh the screen and reopen the connection to your remote host.

23 Saving connections

Unfortunately, there is no real way to 'store' a set of connection strings to different machines within shellinabox. The best option open to you is to configure a series of daemons on different ports tunnelling to different machines, and then you can save the URLs to these servers as bookmarks in your browser.

24 Where to now?

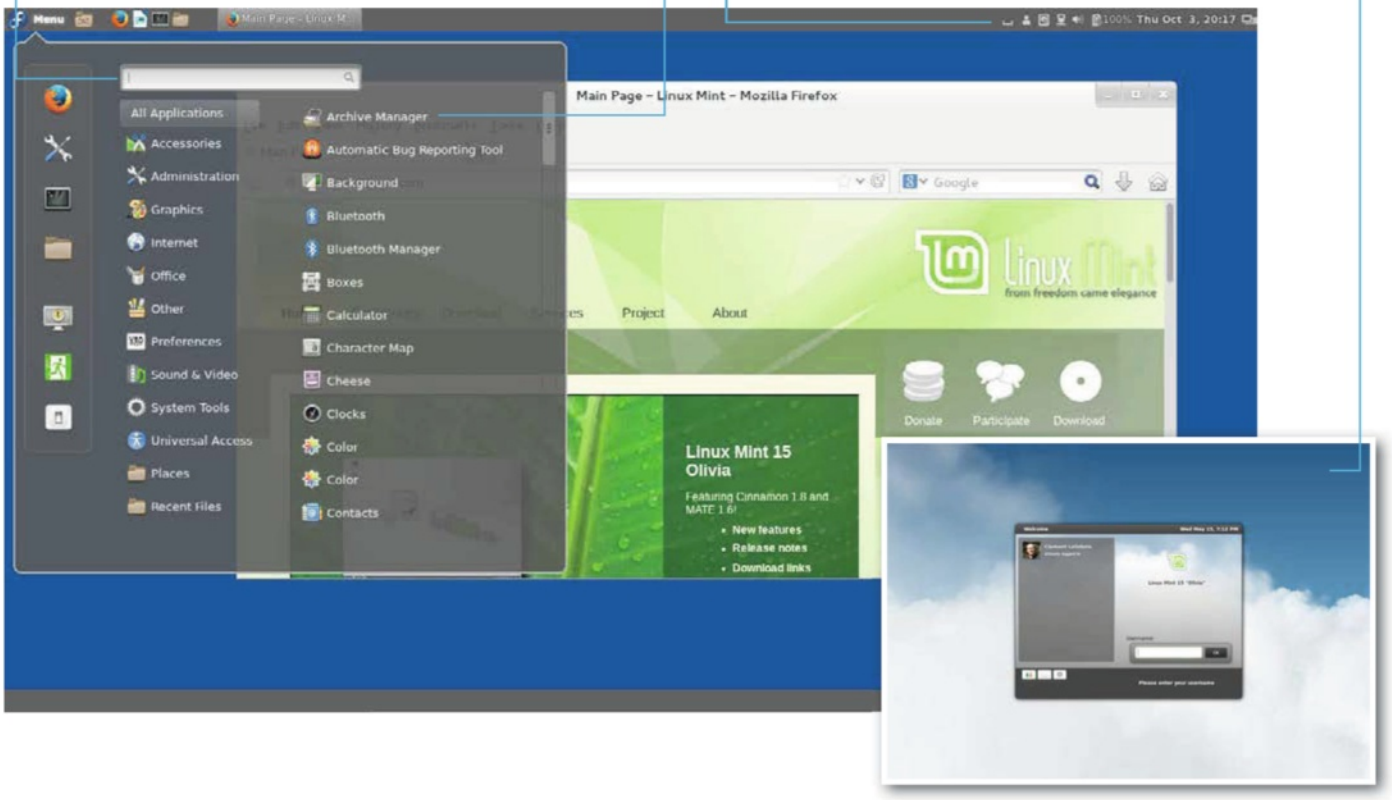
Hopefully this tutorial will have shown you some options that are available when you get stuck with an overly locked down machine. If these don't fit your exact situation, don't be afraid to look for some of the other options available out in the wild.

Have a more traditional application menu, with the search functions of the newer desktops

Customise the layout of apps so you have your favourite programs within easy access

Find and install extensions such as applets and desklets to enhance your user experience

Use Linux Mint's MDM display manager to get the full Linux Mint experience



Install Cinnamon on your system

Learn how to install the Cinnamon desktop environment on some of the most popular desktop distros, as well as how to configure it to your needs

Advisor

Rob Zwetsloot models complex systems and is a web developer proficient in Python, Django and PHP. He loves to experiment with computing

Resources

Cinnamon:
cinnamon.linuxmint.com/?page_id=61

openSUSE One-click package:
software.opensuse.org/package/cinnamon

Cinnamon 2.0 is here, the next and most important iteration of Linux Mint's own desktop environment. While originally a GNOME fork, Cinnamon 2.0 is now completely removed from any GNOME back-end, making it a fully independent DE. It's not just for Mint, though: it's a fully open source project and is readily available to get on the Linux distro of your choice as well.

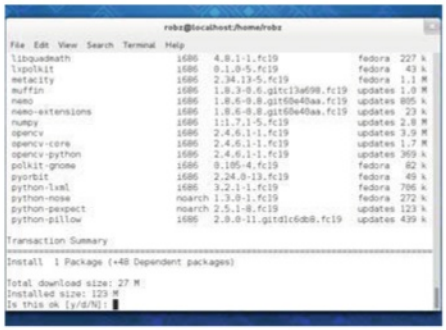
While some distributions have it in their repositories, others require a bit more work to get it installed. That's not the end of it either, as there are plenty of ways to customise Cinnamon to enhance your experience and workflow, as well as a few aesthetic tweaks to just make it more personal.

We'll be covering how to get it installed on Fedora, openSUSE, Debian and Ubuntu. However, the methods will apply to a lot more distros, and the customisation will be useful for Linux Mint users too.

Install Cinnamon on your system

How to install Cinnamon on popular desktop distros

TUTORIAL



01 Fedora install

Cinnamon was added to the Fedora repos around about a year ago and is very easy to install as an alternative to the GNOME Shell if you're not a fan of it. Install it with:

```
$ sudo yum install cinnamon
```

02 Cinnamon change

In all the distros we're installing Cinnamon on, you'll need to know that it joins the current desktop environment as options for the user to choose. To start using Cinnamon, you'll need to log out, find the session manager on the login screen and change to Cinnamon

03 OpenSUSE install

For openSUSE, you need to first make sure that GNOME 3 is installed – either by using the GNOME image or installing it otherwise. You can then use the one-click install method from openSUSE's Cinnamon package site to get Cinnamon installed.

04 Debian repo

In Debian, Cinnamon is not a default package in the repos, so you'll need to add it to the Apt repositories to get it to work. Firstly, add the source to the repo list like so:

```
echo'deb  http://packages.linuxmint.com/
debian main import backport upstream
romeo' >> /etc/apt/sources.list
```

05 Debian Install

Once that's added, you need to then update Apt with:

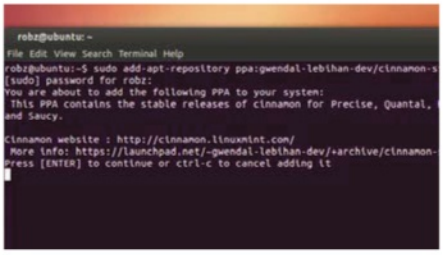
```
$ sudo apt-get update
```

...and then install the keyring and the desktop environment using:

```
$ sudo apt-get install linuxmint-keyring
```

```
$ sudo apt-get install cinnamon-desktop
cinnamon-session cinnamon-settings
```

Once this is finished, log out and select the Cinnamon session.



06 Ubuntu repository

The Linux Mint team maintain a PPA for Ubuntu with the latest version of Cinnamon. To add this to Ubuntu, open the terminal and type:

```
$ sudo add-apt-repository
ppa:gwendal-lebihan-dev/cinnamon-
stable
```

Press the **Enter** key when it asks you to confirm the repository.

07 Ubuntu install

Once the PPA is added, you will need to update the software list like in Debian. To do this, use:

```
$ sudo apt-get update
```

Once that's complete, you can simply install it with one command:

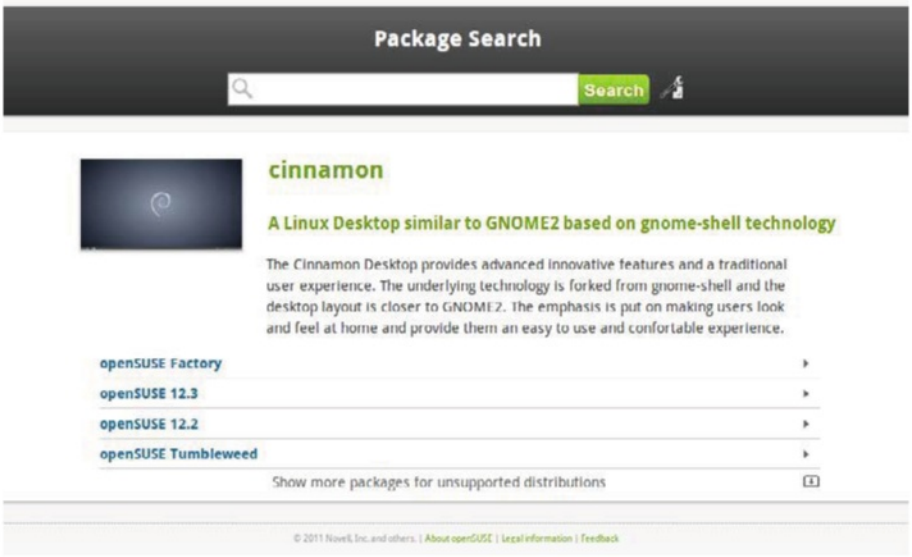
```
$ sudo apt-get install cinnamon
```

08 Ubuntu login

If you're using standard Ubuntu, the session selection is not the most obvious thing. Log out after Cinnamon has installed and then click on your username. Next to it will be the Ubuntu logo in a circle – clicking that opens up the session manager, where Cinnamon should be listed.

09 Cinnamon start

Cinnamon works differently to GNOME or Unity – there's a traditional panel at the bottom, with all the open windows visible on it. The Mine Menu works similarly, though, but instead of taking up the whole screen, it just opens on the side, allowing you to search for apps and documents.



10 Quick launch

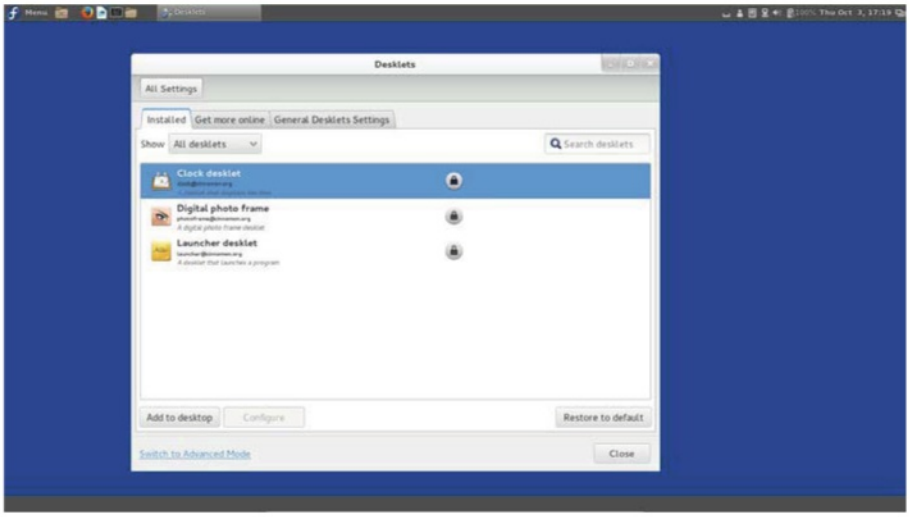
Now we can start customising the way we use Cinnamon. First of all, we can begin adding applications to the quick launch bar on the panel at the bottom of the screen. Open the Mint menu and drag and drop any programs you want onto the bar. These can be removed by right-clicking.

11 Favourites

The Mint menu has some apps already listed on the side, these are where the favourite programs live. These can be added and removed by right-clicking on apps in the menu and selecting 'Add to favourites'. You can also move them up and down.

12 Panel

In the System Settings, you'll find the Panel option. This allows you to move the panel to the top of the screen to be more like GNOME 2, and you can even make it so there is a panel on both the top and bottom with Classic mode.



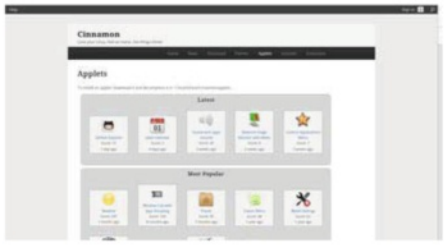
13 Desklets

A recent feature of Cinnamon is the ability to add desklets, widget-like desktop-bound items that work like Android or other operating systems. These can be found in System Settings under Desklets, and there are a few extra you can download from the web.

14 Applets

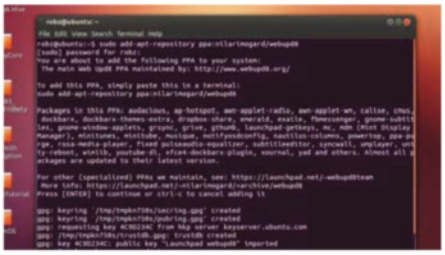
The applets came before desklets, and allow you to add functionality to the panel. Right-clicking on the panel will let you go to the applet menu; you can add some useful tools such as the Display applet for if you regularly use different monitors, and the expo view so you don't have to move your mouse up into one of the hot corners.

> **Now we can start customising the way we use Cinnamon**



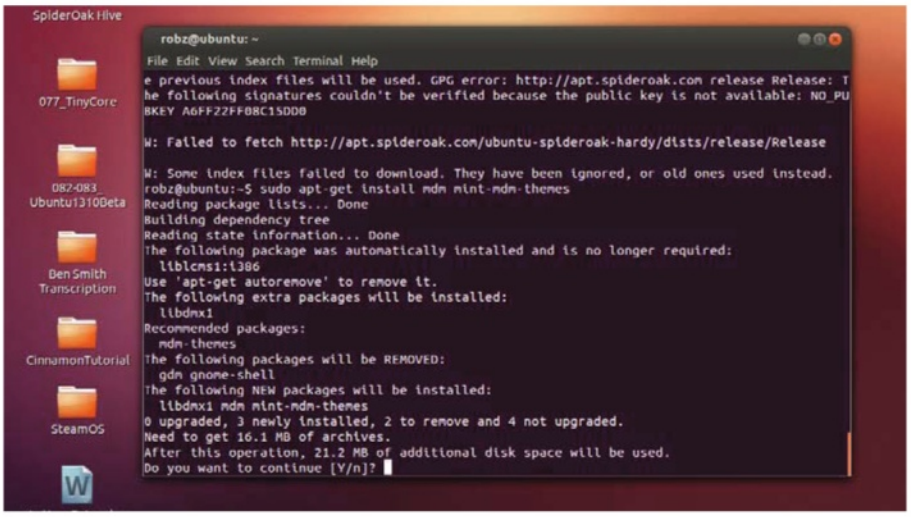
15 Spice up your distro

Getting new desklets and applets is made easy using the Spices website – this is accessed via **cinnamon-spices.linuxmint.com**. Some of these will already be accessible via the applet and desklet menu, but you can perform a much better search of these and the desktop themes. Click on the extension in the browser to download a zip with the files in. Uncompress the files into **~/.local/share/cinnamon/applets** and then activate it from the panel menu.



16 Manage displays

As well as Cinnamon, you can add Linux Mint's MDM Display Manager to your system, which can be themed with animated HTML5 login screens. For Ubuntu, you'll need to add a new



repository first with:

```
$ sudo add-apt-repository
ppa:nilarimogard/webupd8
```

17 Ubuntu MDM install

Like how we installed Cinnamon, you'll need to install MDM by first updating your software list with:

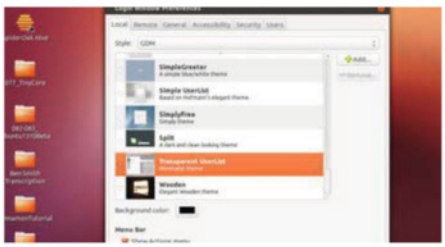
```
$ sudo apt-get update
```

...and install with

```
$ sudo apt-get install mdm mint-mdm-
themes
```

18 MDM setup

During the installation of MDM, a screen will pop up, asking you which display manager you would like to use. Select MDM from the list and let the installation continue on as normal afterwards. A restart is required for it to take effect.

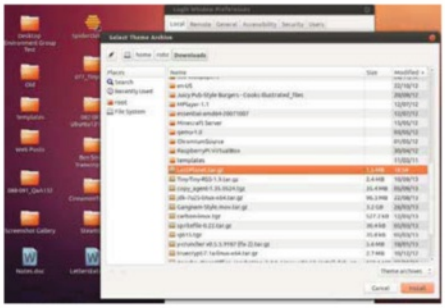


19 MDM beginnings

You'll need to first theme it with a more usable look. Find Login Window Properties by searching in the Mint Menu search bar and open the tool. Locate one with a simple user menu and click the radio button to enable it for when you restart or logout.

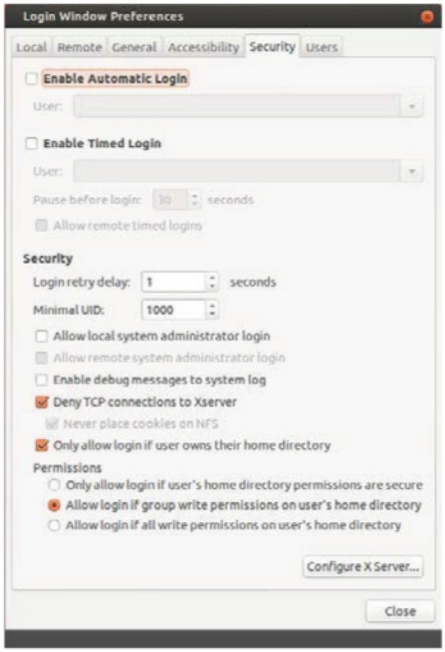
20 HTML5 themes

There are a few places you can find HTML5 themes for Linux Mint – either a quick Google search will help you find some, or you can check out the great work of Sam Riggs over at **samriggs.deviantart.com**.



21 Theme install

Once you've found a theme you like, download it to your system and then go back to the login window manager. Click Add, then navigate to the archive of the theme you just downloaded. It will install it and let you select it for when you log out or restart.



22 Login manager

From the login manager, you can also set up automatic or time login, both for specific users, and the latter allows you to set a time-out for the default user so someone else can log in.

23 Change back

You can change the display manager back; simply use **dpkg-reconfigure** with the display manager you want back, and follow the instructions like before to set the default. The same can be done with Cinnamon by selecting a different desktop before logging in.

24 Mint and beyond

Cinnamon is a fantastic desktop environment that really helps people who use a slightly older workflow system. While for a Fedora base, this is the best way to use it, why not try Linux Mint instead of the standard Ubuntu in the future?

Advisor

Christian Heilmann is principal evangelist for Mozilla, with a focus on the open web and HTML5. He built his first website around 1997 and spent the following years working on lots of large, international web projects

We're happy to have had a flying visit from Mozilla's Christian Heilmann this issue, who brings you a getting-started guide to Firefox OS development...

Firefox OS isn't just any mobile operating system – it's powered completely by web technologies. Why does that matter? Once the platform matures you'll find its speed, customization and intuitive user experience a boon. Since you're already 'in' the web, you can get rid of lengthy app downloads and do things that traditional mobile operating systems simply can't.

For developers, though, the advantages are even greater. Since Firefox OS is built on an open platform, using a Linux kernel to boot into a web runtime environment, developing and customising user experiences has never been easier. Since it uses the same Mozilla Gecko web engine that powers the Firefox web browser, a Firefox OS-powered smartphone's hardware is exposed to Mozilla's web APIs. This means that every feature you can imagine can be developed as a web application. Interested? Here's how to get started today...

How to get started

Firefox OS is HTML5. There is no Java, C# or Objective C. Firefox OS gives developers full access to the mobile phone's functionality with HTML5, CSS and JavaScript. A mobile website can be very easily transformed into a Firefox OS application. You just need to define the offline data using AppCache and LocalStorage or IndexedDB and specify the name and access rights of the app in a manifest.

An example manifest looks like this (see **tinyurl.com/pfvsoy8** for more details):

```
{   "name": "My App",
"description": "My elevator pitch goes
here",
"launch_path": "/",
"icons": {
     "128": "/img/icon-128.png"
},
"developer": {
     "name": "Your name or organization",
     "url": "http://your-homepage-here.
org"
},
"default_locale": "en"
}
```

The offline definitions are needed in any case, so that the app can also be made to run on iOS and Android. If you have an existing HTML5 app in the web, you're only two steps away from joining in with Firefox OS:

1. Create an open app manifest.

2. Register the app in the Firefox OS Marketplace (**https://marketplace.firefox.com**)

Creation of the app is not bound to a specific IDE or work environment. As is also the case in web development, everything can be used,

> A mobile website can be very easily transformed into a Firefox OS app

from vi on the command line, right up to Eclipse; whatever you feel most comfortable with. So far, there is still no defined SDK and developers don't have to register or pay fees. Mozilla's fundamental idea is to keep the web free and accessible for everybody, and Firefox OS reflects this.

Security levels for apps

In an open app manifest, the developer defines what the app should be called, which icons are used and which of the mobile phone's functions the app has access to. With Firefox OS apps, there are generally three security levels that define everything the app has 'permission to do'. This is necessary to ensure, for example, that not every app is allowed to send text messages or make phone calls without the end user knowing about it. The three different security levels are hosted, privileged and certified.

A detailed listing of everything that apps are allowed to do and which security levels are required can be found under **https://developer.mozilla.org/en-US/docs/Apps/App_permissions**.

Put briefly, the various security levels indicate the following...

Hosted app: This app can be stored on your own server, therefore making it easy to amend and maintain. However, as Mozilla does not manage the server and cannot vouch for its security, the app will only be permitted to access a fraction of the hardware.

Privileged app: This app has greater access, must be certified by the Mozilla Marketplace Team and include a Content Security Policy (**www.w3.org/TR/CSP/**). Furthermore, privileged apps must have a signature and require installation via the Firefox Marketplace.

Certified apps: These define the functionality of the operating system and can therefore access everything. These can only be created by Mozilla and its partners.

The type of app dictates the web APIs that may be used.

Web APIs

Apps in Firefox OS can access the hardware via web APIs (**https://wiki.mozilla.org/WebAPI**). Unlike conventional platforms for HTML5, such as iOS and Android, developers have direct access to the various hardware components of the mobile phone via JavaScript. For example, they can read out the battery charge level as a percentage with **window.navigator.battery.level**, or make the phone vibrate for one second with a simple **window.navigator.vibrate(1000)**. This functionality is defined as a web API standard and is also already supported by other browsers.

All app types are also capable of penetrating deeper into the system, but not automatically; clearance is required from the user. This is what the Web Activities feature is for.

First own app

There are various possibilities for testing the app. The simplest of these works directly from the desktop, using the Firefox OS Simulator add-on. This simulator can be started up easily via the browser: **Tools>Web Developer>Firefox OS Simulator**. Here, you'll receive a simulated mobile phone with Firefox OS, a console displaying errors and information, and the possibility to test apps in Firefox OS from the hard drive. You will get the best results by using Firefox Nightly as your browser. In the meantime, the first Firefox OS smartphones have hit the market, meaning that developers can now test their apps directly on the hardware.

Earn money with Firefox OS apps

Developers play a decisive role in Firefox OS and should also be rewarded for their efforts. The revenue share varies depending on the region, payment method, fiscal framework conditions and marketing method. Mozilla supports the direct payment method for operators, such as Telefónica, which makes it easier for users to buy apps, even if they don't have a credit card. The payout process for developers is dependent not only on the payment method but also on payment regulations, which differ from one country to the next. However, the objective is to ensure that developers are paid for Marketplace purchases within 60 to 90 days.

Useful links

App Manifest: An open-web app manifest contains the information a web browser needs to interact with an app: **tinyurl.com/pfvsoy8**

App permissions: An overview of what an app is and isn't allowed to do: **tinyurl.com/qcgs4ew**

Firefox OS Developer Hub: Detailed info on what a good HTML5 app will look like (with downloadable demos), how you can register and sell your app in the Marketplace and how to install Firefox OS on your own hardware: **tinyurl.com/oyd5blp**

Firefox OS Simulator: Download the add-on and test your apps on the desktop: **tinyurl.com/byakrvp**

Firefox Marketplace: Developers can list and sell HTML5 apps via the Firefox Marketplace: **https://marketplace.firefox.com**

Mozilla Developer Network (MDN): MDN is a wiki that allows anyone to add or edit content. Tasks range from proofreading to API documentation. Developers can find all required info on Firefox OS here: **https://developer.mozilla.org**

Developers can also launch a new app. The Boilerplate app (**https://github.com/robnyman/Firefox-OS-Boilerplate-App**) from Robert Nyman can be used as a basis. This app adjusts automatically to the screen and offers all available Web Activities in the form of buttons in the interface. In addition, the app can also be installed from the web by means of a button, without having to be logged into the Marketplace.

App distribution, Firefox OS Marketplace and adaptive app search

The Firefox Marketplace is an app store, where developers can market apps and users can search for apps. Developers also have the possibility of simply creating apps with an 'Install' button in the web.

This allows developers to promote their apps on their own websites. Instead of sending visitors to an app store, they simply switch from the site to the app. This is exactly what happens during an adaptive app search in Firefox OS. The search results are the mobile-optimised websites and all required offline data can be downloaded, if the visitor chooses to install the app.

With the adaptive app search, the search box doesn't just help users to find the apps on the phone, but also those in the Mozilla Marketplace and on the web. Rather than having to know the name of the app, you simply search for whatever it is you'd like to have, for example, 'Football'.

Go program!

An introduction to one of the hottest programming languages of the moment. Find out if Go is right for you

Advisor

Sean M Tracey is a creative technologist at a leading digital agency. He spends a lot of his time living inside of Node.js, Python and Arduino

In 2007 Robert Griesemer, Rob Pike and Ken Thompson started writing the language we're going to be talking about today. Ken and the two Robs felt that, over the years, languages such as C++ had become too cumbersome to quickly develop with and, instead of following the path of developers before that tried to fix these problems, they decided to start again from scratch. That's how we have Go. Go's been out in the real world for a little while now. It was designed to be quick to learn, quick to write and quick to run and it is certainly that. At a glance, Go (or Golang) will look very familiar to those of us who spend our days writing programs in a C-like language, but Go has a few gotchas and nuances that we're going to look at in this article. We're going to quickly walk through setting up Go on a Linux system (we've used Ubuntu 12.04 but it'll run on OS X and Windows), the Go I/O standard library, variable declaration, loops, structs, slices and various other little bits that developers will find useful in their coding adventures.

Installing Go

If, you're quite lucky, you might be able to install Go with one swift command of the terminal:

```
sudo apt-get install golang
```

If all has gone well, you will now have Go on your system. Hurrah! But, for the sake of variety, let's assume that's not happened. Let's go and install from source instead so we can all share in the Go goodness. Head on over to **code.google.com/p/go/downloads/list** and grab **go1.1.2.src.tar.gz** (at the time of writing, this was the latest version of Go). Extract the tar.gz to wherever you like and head into the **src** folder that you'll find in there.

Assigning variables in Go is very straightforward and flexible

Setting constants is much stricter, for obvious reasons

Function definitions are very user-friendly in design and implementation

Notice how Go allows you to assign two variables by returning two values

Example variables & functions code listing

```
1  //Example 1:
2  a = 1
3  b = 2
4
5  //Example 2:
6  a, b := 1, 2
7
8  //or
9
10 var a, b int = 1, 2
11
12 //Example 3:
13 var a, b, c = 1, true, "Hello"
14
15 //Constants can only be set like this
16 const x = 12
17
18 //##### Functions
19
20 //Example 4:
21 func example(x int, y int){
22     fmt.Println(x + y)
23 }
24
25 //Shorthand
26 func example(x, y int){
27     fmt.Println(x + y)
28 }
29
30 //With return
31 func timesTwo(x, y int)(int, int){
32     return x * 2, y * 2
33 }
34
35 func main(){
36     h, i := timesTwo(2, 6)
37     fmt.Prtinln(h, i) // h == 4, i == 12
38 }
39
40 //Alternative way with namesd variable return
41 func timesTwo(a, b int) (x, y int) {
42     x = 1 * 2
43     y = b * 2
44     return
45 }
```

Assuming you have GCC or another C compiler installed on the system, we're ready to get this thing going. As it often is, Google has been very kind and has included a handy Bash script to install and test Go for us. Fire it off with:

```
sudo ./all.bash
```

And make yourself a cup of tea. Like most source builds, this can take a little while. Just before the Bash script exits, you should see something along the lines of:

```
Installed Go for [YOUR ARCHITECTURE]
in /home/[USERNAME]/go.
Installed commands in /home/
[USERNAME]/go/bin.
*** You need to add /home/
[USERNAME]/go/bin to your $PATH. ***
```

If you can see that, everything has gone well. Now, just like the script says, we need to add Go to our system PATH. Everybody has their own preference when it comes to their system but you can put it into your **.profile** file in your home directory so it's accessible across the system like so:

```
PATH="$HOME/gosrc/go/bin"
```

Now, enter `go` in your terminal and you should see the help dialog listing all the commands we can invoke when executing a Go script.

Hello world

Let's write a quick 'Hello world'. Create a file called **lets.go**. If you execute:

```
go run lets.go
```

You should see 'Hello, world' pop up in your terminal. Let's step through what we've written here. **package main** is basically Go's way of creating a namespace for the code contained in the file. If we were to write, say, a module for use in other programs then we could use most

helloWorld.go code listing

```
1  package main
2
3  import("fmt")
4
5  func main(){
6      fmt.Println("Hello, world")
7  }
```

■ Now that we have a working environment, we can run a nice little 'Hello world'

Where's it going?

New languages pop up all the time. So what makes Go different?

Go is a really exciting language: it's quick to learn, fun to write and really fast at running. It's true, new languages appear all the time. Anybody and their mother can learn how to write a compiler, but Go has some of the best software engineers in the world tinkering away with it. It's got a long way to go before it can stand to challenge the likes of Python or Java and it's going to take time for people to acknowledge it as a genuine competitor, but remember how seriously people took Node.js when it was first released? JavaScript... On the server? Wha? Now look where it is.

Go already has a massive package base to save developers time, so there's nothing getting in the way between a developer and a pet project. As for current real-world applications, Google recently rewrote its content delivery system with Go. Now that's commitment.

any name we like. The general convention is that the package name is the same as the import path. **import("fmt")** simply imports the stand I/O library for Go. It can be written so that one statement imports many libraries or just one at a time like so.

Single statement:

```
import("fmt", "math", "net")
```

Multiple statement:

```
import "fmt"
import "math"
import "path"
```

When executed, Go will look to run the **main()** function first.

Variables

Variable declaration is a little different in Go than it is in other languages. There are multiple ways of achieving the same effect, If you look at **Example 1** on the preceding page, it can also be written like **Example 2.**

In each of these instances, a == 1 and b == 2. You'll notice that when we used the **var** keyword, we declared the variable type just before we assigned a value. When we declare the variable type at the end of this declaration, all of the variables will be that type. If we are assigning values in this way and the types vary then Go will assign them based on the value passed.

In **Example 3**, **a** will become an integer, **b** will be a Boolean and **c** will be a string. Go has constants too. They can be set like so:

```
const x = 12
```

But you can't declare the type like you can with a variable. That's inferred from the value.

Functions

Functions in Go can do some cool things. In our 'Hello world' we used the most basic implementation. If we want to write a function that accepts variables, we can write it like so:

```
func example(x int, y int){
    fmt.Println(x + y)
}
```

Notice how we declare the types after we name the variable we're expecting. If the types are the same we could write instead:

```
func example(x, y int){
    fmt.Println(x + y)
}
```

If we wanted to return values we would write something like this instead:

```
func timesTwo(x, y int)(int, int){
    return x * 2, y * 2
}

func main(){
    h, i := timesTwo(2, 6)
    fmt.Prtinln(h, i) // h == 4, i == 12
}
```

Notice how we assigned two variables by returning two values. If we were so inclined, we could name these variables and return them like so:

```
func timesTwo(a, b int) (x, y int) {
    x = a * 2
```

```
    y = b * 2
    return
}
```

Functions in Go can also return closures. But we must be careful to realise that we aren't returning a function – we're returning the result of a function that was executed when the function that was called was returned. It's a little confusing:

```
func aFunction(x, y int) int{
    randomNumber := 5
    return func(x, y int) int {
        return x + y + randomNumber
    }
}
```

Notice that in **aFunction()** we're specifying that an integer is being returned, not a function. If this was JavaScript, you'd be returning the function as an object that could be executed in the scope from which it was called with reference to the scope that it had. In Go, we're only ever executing the function in the context with which it was called; unlike JS, the function itself is not returned – the result of that function is.

Slices

Arrays in Go are interesting things. For a start, they're known as slices. You can create a slice that has a set capacity but no length. If we know what we're going to put into a slice right away then we can create one like this:

```
numbers = []int{1, 2 ,4, 8, 16, 32, 64, 128}
//numbers[3] == 8
```

Like in C, If we don't immediately have the information that we're going to store in the slice, we have to tell it how many items it can contain. We do this by constructing a slice with the **make** keyword. This slice will have a length of 5:

```
numbers := make([]int, 5)
```

If we assign **numbers[0] = 2** it would behave as we'd expect, but if we try to assign numbers greater than the length of the slice we'll get an out of range error.

Note that slices can be sliced into smaller slices. For instance, if we have a slice of numbers, we can create a subset using the following code:

```
numbers = []int{1, 2 ,4, 8, 16, 32, 64, 128}
lessNumbers = numbers[1:3]
```

lessNumbers will be a slice of the values from 1 to 3 of numbers.

Structs

Go has structs which are kind of like classes in C or objects in JavaScript. We can create instances of structs to store variables. Let's say we wanted a way of storing map co-ordinates. Let's look at the code below.

When we set the variable, the order in which we pass the variables into the struct is the order that the properties within will be assigned. Reassigning a value after its creation is simple:

```
london.longitude = 0.1075
```

If we wanted to have a slice of structs then we would declare the type that the slice is to contain the struct like so:

```
var places = [3]Coordinates{}
```

Then we could pass through a struct to the slice like this:

```
places[0] = Coordinates{1.1, 2.2}
```

Packages

You may have noticed so far that we always include **package main** whenever we write a Go script. Go comes with a large catalogue of packages that can be used in any Go program. The **main** package tells our program where to execute from. If we were writing a package to be used in another script, we would give it another name. Let's say we made a **Bournemouth** package:

```
package Bournemouth

func isAwesome() bool{
    return true
```

Example slices & structs.go code listing

```
1   numbers = []int{1, 2 ,4, 8, 16, 32, 64, 128}
2   //numbers[3] == 8
3
4   numbers := make([]int, 5)
5
6   numbers = []int{1, 2 ,4, 8, 16, 32, 64, 128}
7   lessNumbers = numbers[1:3]
8
9
10  //#### Structs
11
12  package main
13
14  import "fmt"
15
16  type Coordinates struct {
17      latitude float32
18      longitude float32
19  }
20
21  func main(){
22      london := Coordinates{51.5072, 0.1275}
23      bournemouth := Coordinates{50.7200, 1.8800}
24      fmt.Println(london.latitude, london.longitude) //51.5072, 0.1275
25      fmt.Println(bournemouth.latitude, bournemouth.longitude) //50.7200, 1.8800
26  }
```

A simple implementation of structs to store individual geo co-ordinates

Using packages together

Go has many well-built packages. This example shows how they can work in tandem

In this small example we're using quite a few of Go's built-in packages. We have the HTTP library, the I/O library for writing files, and the flag library for parsing arguments made to the script. When you execute `go run requestStore.go -URL=[ANY VALID WEB ADDRESS]` it will parse the URL flag, make an HTTP request to the page specified, get the response body of that request and then store it in a file. If you combine the elements of this code with the distance calculator, you should be able to pass in new points.

```
}

func isSunny() bool{
    return true
}
```

You'll notice that we're not calling the main function here. This is because this script isn't going to be executing any code on its own – it exists to be used by a program. Run:

```
go build
```

...and if you don't see any errors, then we've successfully made a package. Run:

```
go install Bournemouth.go
```

...and Go will move this package to the **pkg** folder in our Go build. Now if we were to import the Bournemouth package into one of our programs, the methods **isAwesome()** and **isSunny()** would be available to the **main** package, just like **Sqrt()** or **Pi()** is when we import **math**.

Putting it all together

So we've covered packages, functions, variable declarations, structs and slices. That should be enough to write a simple but useful program. So let's do that. Create a file called **distance.go**.

The first thing we're going to import (after the usual **fmt**) is the **math** package. We're going to be doing some calculations, so we're going to need the square root function that this package exposes.

Next, we create the **Coordinates** struct, Just like we did before but this time we're including a **name** property too.

Now we want to create a **places** slice. For this example we're going to have three locations (London, Bournemouth and Glasgow) so we'll create a slice with a length of **[3]**. We're going to be containing Coordinates structs in this slice so we need to declare that after the [3]. After that, we enter the geolocation co-ordinates for each location – latitude then longitude – then the name.

The **distance** function is quite simple. The calculation will work out the difference between the two points on a map and then convert that to miles. (If you'd like kilometres, you can multiply the returned value of the distance function by 1.6.)

In the **main()** function we can assign **pointA** and **pointB** to any item in the places slice. When we run the script, it'll output how far it is between points A and B. And there we have it, our first Go program that uses all the parts of this tutorial.

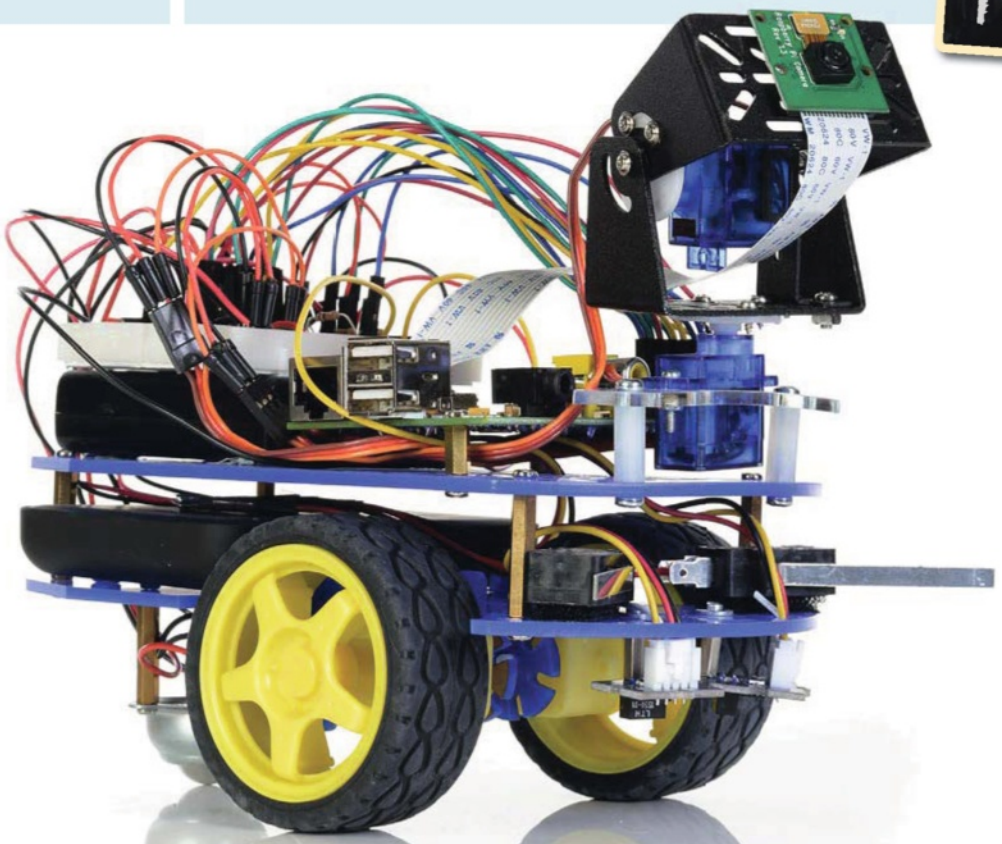
Finishing up

It's always hard covering the ins and outs of a new language, since every individual aspect of the latter could easily take up this space on its own. Hopefully, this tutorial will have given you enough of a reason to get excited about using Go in some of your day-to-day projects.

distance.go code listing

```
1   package main
2
3   import(
4       "fmt"
5       "math"
6       )
7
8
9   var places = [3]Coordinates{ Coordinates{51.5072, 0.1275, "London"}, ↵
Coordinates{50.7200, 1.8800, "Bournemouth"}, Coordinates{55.8580, 4.2590, ↵
"Glasgow"} }
10
11  type Coordinates struct{
12      latitude float64
13      longitude float64
14      name string
15  }
16
17  func distance(a,b Coordinates) float64{
18
19      return math.Sqrt( ( a.longitude - b.longitude ) * ( a.longitude - ↵
b.longitude ) + ( a.latitude - b.latitude ) * ( a.latitude - b.latitude ) ↵
) * 69.174; //69.174 miles = 1 degree of latitude on Earth's surface
20
21  }
22
23  func main(){
24
25      pointA := places[0]
26      pointB := places[2]
27
28      fmt.Println("It is ", distance(pointA, pointB), " miles from ", ↵
pointA.name, " to ", pointB.name)
29
30  }
```

The code for **distance.go**. Using co-ordinates, we can calculate the distance between two points



Control your Raspberry Pi robot from a web-connected device

Advisor

Liam Fraser is a programmer and sysadmin. He is the creator of the RaspberryPiTutorials YouTube series and volunteers as a Linux server administrator for the Raspberry Pi Foundation

Resources

A Raspberry Pi robot (see LUD 132 for instructions)
A Raspberry Pi Camera Module
Wi-Fi connectivity

Last issue we built a Raspberry Pi robot. This issue, we'll create a Python web application that lets you control your bot using a first-person view

After building our Raspberry Pi last issue, we've all been thinking up ideas for tutorials to extend Jonny Pi's skills and abilities. One of the first ideas we had was to control our robot from a web-connected device using a simple web application. To make things even more interesting, we've decided to incorporate the Raspberry Pi Camera Module so we can show a first-person perspective of what Jonny Pi can 'see'. In theory, as long as you're within Wi-Fi range of your robot, you can drive it around simply by watching the feedback from the app itself.

To do this, we'll teach you how to use the mjpg-streamer software to stream video straight from the Raspberry Pi camera to your web browser. Once we have that in place, we'll be converting the movement code from the previous issue's guide so it can be executed from our little web application, and then we'll write said web app in Python. It's as easy as Pi!

Control your Raspberry Pi robot from the web

Create a Python web app to control your bot using a first-person view

TUTORIAL

01 Connect the camera

The camera should be connected to the Raspberry Pi with the blue side facing the back of the Ethernet port, and the side with the pins facing the SD card. Lift the connector, then slide in the ribbon cable as far as it will go, and push down the connector to secure the cable.

02 Enable the camera

Log into the Raspbian system with the username **pi** and the password **raspberry**. You may have an old version that doesn't support the Raspberry Pi camera. Run `sudo apt-get update` followed by `sudo apt-get upgrade` to make sure you are up to date. Once you've done that, run `sudo raspi-config` and select the option to enable the camera. You need to reboot for the changes to apply.

03 Install mjpg-streamer dependencies

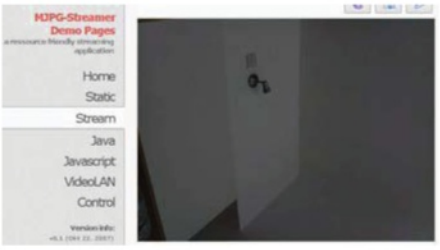
We're going to be using an experimental version of mjpg-streamer that has an input module for the Raspberry Pi camera. It isn't packaged for the Raspberry Pi, so we'll need to compile it ourselves. Update the package index with the command `sudo apt-get update`. We need to install Subversion, which we'll use to download source code. We'll also need libjpeg and imagemagick, both of which are required by mjpg-streamer. You can install these with:

```
sudo apt-get install git cmake libjpeg8-dev imagemagick
```

04 Compile mjpg-streamer

Download and compile mjpg-streamer as shown below:

```
git clone https://github.com/liamfraser/mjpg-streamer
cd mjpg-streamer/mjpg-streamer-experimental
make clean all
```



05 Start testing

Before we can start mjpg-streamer, we need to export the directory that it's in so that the loader knows where to load the various input and output modules from. We export this as STREAMER_PATH so that we have a nice name, but the path actually needs to be in the LD_LIBRARY_PATH for the modules (.so files) to be found. We set these variables like so:

```
export STREAMER_PATH=/home/pi/mjpg-streamer/mjpg-streamer-experimental

export LD_LIBRARY_PATH=$STREAMER_PATH
```

And then start mjpg-streamer in the following way:

```
$STREAMER_PATH/mjpg_streamer -i "input_raspicam.so -d 200" -o "output_http.so -w $STREAMER_PATH/www"
```

...where `-d $number` is the number of milliseconds between captures. You can view the stream by going to http://[pi ip address]:8080/stream.html.

06 Start mjpg-streamer at boot

Make a backup copy of /etc/rc.local with `sudo cp /etc/rc.local /etc/rc.local.bak`. Then edit /etc/rc.local (with sudo) to contain all four lines from the previous step, adding a space followed by an ampersand to the end of the last line, making sure that **exit 0** is still at the end. Reboot the Pi to make sure it works. The end of your rc.local file should look as below:

Step 06

```
...
fi

export STREAMER_PATH=/home/pi/mjpg-streamer/mjpg-streamer-experimental
export LD_LIBRARY_PATH=$STREAMER_PATH
$STREAMER_PATH/mjpg_streamer -i "input_raspicam.so -d 200" -o "output_http.so -w $STREAMER_PATH/www" &

exit 0
```

07 Install Apache and required modules

We're going to be using Apache as our web server, WSGI as our method of executing Python from the web server, and Pyro (Python Remote Objects), to call functions to move the camera and the robot without needing to run the web server as root to access the GPIO. (mjpg-streamer is actually running as root when executed from rc.local, but that could be easily fixed by making it run as the www-data user instead. Alternatively, you could make it listen on localhost only and reverse proxy web requests for video from Apache to mjpg-streamer.) Install the above packages using:

```
sudo apt-get install apache2 libapache2-mod-wsgi pyro
```

We also need to start a Pyro nameserver so we can connect to our movement module remotely later on. Edit **/etc/default/pyro-nsd** and change **ENABLED** to equal 1. Then start pyro-nsd:

```
sudo /etc/init.d/pyro-nsd start
```

08 Configure WSGI

To use WSGI, we'll want to create a user to run the code as. Our expert called his **robotweb**. Use the command `sudo adduser robotweb` with a password of your choice. Then edit **/etc/apache2/sites-enabled/000-default** using sudo and your favourite editor. Add the following lines inside of the VirtualHost tags just before the ErrorLog section:

```
WSGIDaemonProcess robotweb user=robotweb group=robotweb processes= 1 threads=2

WSGIProcessGroup robotweb

WSGIScriptAliasMatch /action /home/robotweb/app.py
```

09 WSGI Hello World

Switch user to robotweb using `su robotweb`. Open **/home/robotweb/app.py** in your favourite editor and add the code at the top of the next page. WSGI always starts by calling the application function of the file you give it, passing through a dictionary

Step 09

```
def application(environ, start_response):

  status = '200 OK'
  output = 'Hello World!'

  response_headers = [('Content-type', 'text/plain'),
                      ('Content-Length', str(len(output)))]

  start_response(status, response_headers)

  return [output]
```

representing the environment, and also a callback function called **start_response** that you use to send it the HTTP status code and any response headers. Once it has those, the main content is returned as a list – in this case containing one string.

Then use `exit` to get back to the **pi** user and type `apachectl graceful`. Any error about Apache not being able to determine the server's name can be safely ignored. **http://[your pi]/action** shows you 'Hello World!'.

10 Create the movement code

The next piece of code is based on the movement and ultrasonic sensor code from last issue's robot feature. However, there's quite a lot of code we won't need from that (the ultrasonic part), so we've rewritten it, adding in the ability to call the code remotely. We've called the file **movement_server.py** (find it on the disc). You'll also need to make the file executable with `chmod +x`. You may want to change the speed constant if your robot is too slow or too fast during movement.

The **movement** class needs to inherit the Pyro Object Base so that it can be called successfully from a Pyro client. For this reason, we need to initialise the **base** class as part of the movement class's initialisation function. Apart from that, it's pretty much a normal class.

For each direction, we set the GPIO voltage to either HIGH or LOW on the appropriate pins, then start the motors, sleep for the amount of time to move, and then call the **stop** function, which simply changes the motor speed to 0.

Finally, we set up a Pyro server by registering with the Pyro nameserver as **robotmovement** and starting a request loop, which simply waits for requests from a Pyro client and executes the appropriate function.

11 Start the movement server on boot

As we did before with mjpeg-streamer, we want to start our movement server on boot by adding it to **/etc/rc.local** before **exit 0**. Our expert used the following line:

```
/home/robotweb/movement_server.py &
```

12 Our web frontend

We're going to be using Twitter's Bootstrap 3 framework for our web front-end, as it looks good and is simple to use. Change directory to **/var/www**. This directory is owned by root, so you'll want to become root using `sudo su`. Start by removing the default Apache start page with **rm index.html**. Then download and extract the bootstrap files:

```
wget "https://github.com/twbs/
bootstrap/releases/download/v3.0.0/
bootstrap-3.0.0-dist.zip"

unzip bootstrap-3.0.0-dist.zip

mv dist/* .

rm -r bootstrap-3.0.0-dist.zip dist/
```

Bootstrap requires jQuery, so we'll also want to download a copy of that, as well as a jQuery plug-in that lets us submit a form without reloading the page. It would be annoying for our camera stream to disappear each time we wanted to command the robot.

```
cd js/

wget "http://malsup.github.com/jquery.
form.js"

wget "http://ajax.googleapis.com/ajax/
libs/jquery/1.7/jquery.js"
```

13 Start the webpage

The next bit of code we need to do is our **index.html**. It should be put in **/var/www/index.html**, replacing the default Apache page we removed in the previous step. You can find it on the disc. We set a title, import the bootstrap style sheet and then define our own style to limit the width of the page. After that, we import the required JavaScript and create a simple bit of code that handles the move form (which we'll be creating shortly) with AJAX rather than typical HTTP requests.

14 Main body of index.html

The body has a header, a container that displays our video stream, and a form that allows us to send a direction – and a period of time to head in that direction for – to our Python web application. When a button is clicked, the value of the seconds text box is sent to the action script, as well as the direction, which comes from the value field of the button that was clicked.

Note that the IP address of the Pi is hard-coded because we need to access the stream on port 8080. This could be improved by giving the Pi a DNS address or reverse-proxying the video stream through port 80 using Apache.

15 Calling the movement code from our web app

Our web application is really simple. It just takes a direction to move in and an amount of time to do it for. The code across the page should replace the Hello World code we put

"Our web application is really simple. It just takes a direction to move in and an amount of time to do it for"

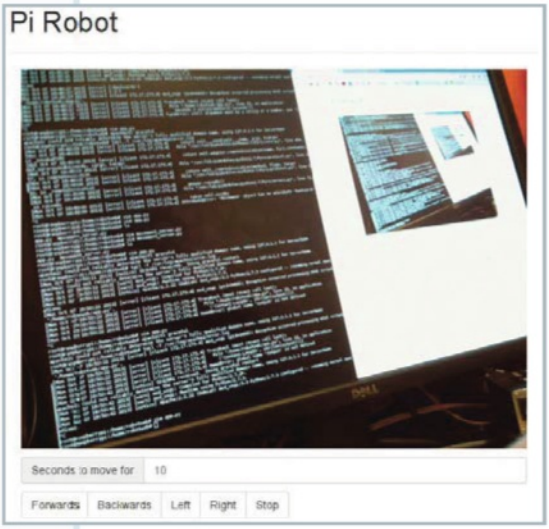
Control your Raspberry Pi robot from the web

Create a Python web app to control your bot using a first-person view

TUTORIAL

Step 15 code listing

```
import Pyro.core
from cgi import parse_qs

def application(environ, start_response):

    # Connect to Pyro
    movement = Pyro.core.getProxyForURI("PYRONAME://robotmovement")

    parameters = parse_qs(environ['QUERY_STRING'])

    if 'seconds' in parameters and 'direction' in parameters:
        direction = parameters['direction'][0]
        seconds = int(parameters['seconds'][0])

        # Call the appropriate function
        if direction == 'Stop':
            movement.stop()
        elif direction == 'Forwards':
            movement.forward(seconds)
        elif direction == 'Backwards':
            movement.backward(seconds)
        elif direction == 'Left':
            movement.left(seconds)
        elif direction == 'Right':
            movement.right(seconds)

        status = '200 OK'

    else:
        status = '400 Bad Request'

    response_headers = [('Content-type', 'text/plain'),
                        ('Content-Length', str(len(status)))]
    start_response(status, response_headers)
    return [status]
```



in **/home/robotweb/app.py**. It's also on the disc. We import the Pyro core so we can use it to remotely call code on the movement server, and also import the **parse_qs** function from the cgi module. This allows us to easily parse query strings (which are sent by the webpage we created in the previous steps) and turn them into a dictionary.

We then connect to our movement server, that we registered with the Pyro nameserver as **robotmovement**. Once we've connected to there, we get our parameters as a dictionary and check that we were sent a valid request. If so, we get the first direction, and number of seconds in the list (there will only be one item in each list), and call the appropriate move function.

If everything went okay then we return a success message, or otherwise a bad request message. However, the user won't see these because they are sent using jQuery so that the camera view doesn't keep refreshing.

16 Yet more testing

Reload Apache with `apachectl graceful`. Any error about Apache not being able to determine the server's name can be safely ignored. Head to the webpage by typing your Pi's IP address into a web browser. From there, use the buttons and the amount of seconds to move for to control the robot's movements. The stop button should override all other buttons.

Notice that we always stop the robot after the time limit, so going forward for 5 seconds and moving backwards for 5 seconds, 3 seconds into the forward movement would move the robot back for 2 seconds and then stop the robot. To solve this potential problem, you could implement a queuing system.

17 How to disable what we've done

You may not want a camera broadcasting footage over the network constantly for obvious reasons. If you want to easily disable what we've just done, you can comment out the four lines we added to **/etc/rc.local** by adding a hash character (#) to the start of those lines. You can disable Apache on boot in Debian with `sudo update-rc.d -f apache2 remove` (this will need redoing each time Apache is updated) and enable it with `sudo update-rc.d apache2 defaults`. `sudo /etc/init.d/apache2 start/stop` will start or stop Apache manually.

18 Further improvements

This article is a good base for a web interface for your Raspberry Pi robot, but there are many improvements that you could make, such as:

- Adding pan-and-tilt capability from last issue's article to the web interface.
- Reverse-proxying the video stream through Apache, as mentioned previously.
- Adding authentication so that only people with a username and password can control the robot and view the stream.
- Using SSL for a secure video connection.
- Working out how long it takes for the motors to complete a full circle and using that info to be able to rotate the robot in degrees.
- Adding a queueing system for commands, as mentioned in step 16.

Write once, use anywhere

Qt is the most flexible cross-platform framework for C++ and can even create cross-platform GUIs. Here's how...

Advisor

Tam Hanna has been in the IT business since the days of the Palm IIIc. Serving as journalist, tutor, speaker and author of scientific books, he has seen every aspect of the mobile market more than once

During the initial development of C, creating GUI applications was considered a non-use case: it was developed on a computer system attached to non-graphical dumb terminals. The average developer spent his time churning away on engine code – which, if designed correctly, would result in an easily portable application.

As time went by, operating system vendors extended C/C++ with a variety of custom libraries. This led to an ever-decreasing level of portability: apps for Windows, Linux and Symbian are built with C++, but the non-domain-level code cannot be shared between platforms.

This ired two Norwegian programmers, who started to develop a product called Quasar toolkit (later known as Qt). Work on the framework started in 1991 and the product managed to achieve a cult following. The tremendous success of the Qt-based KDE framework led to concerns about the closed nature of the framework.

Qt's creators Trolltech addressed this issue with the introduction of a dual-licensing scheme. From that date onward, the framework was provided in two forms. Commercial users could buy the code, which permitted them to keep changes to themselves, while a GPL'd version also became available.

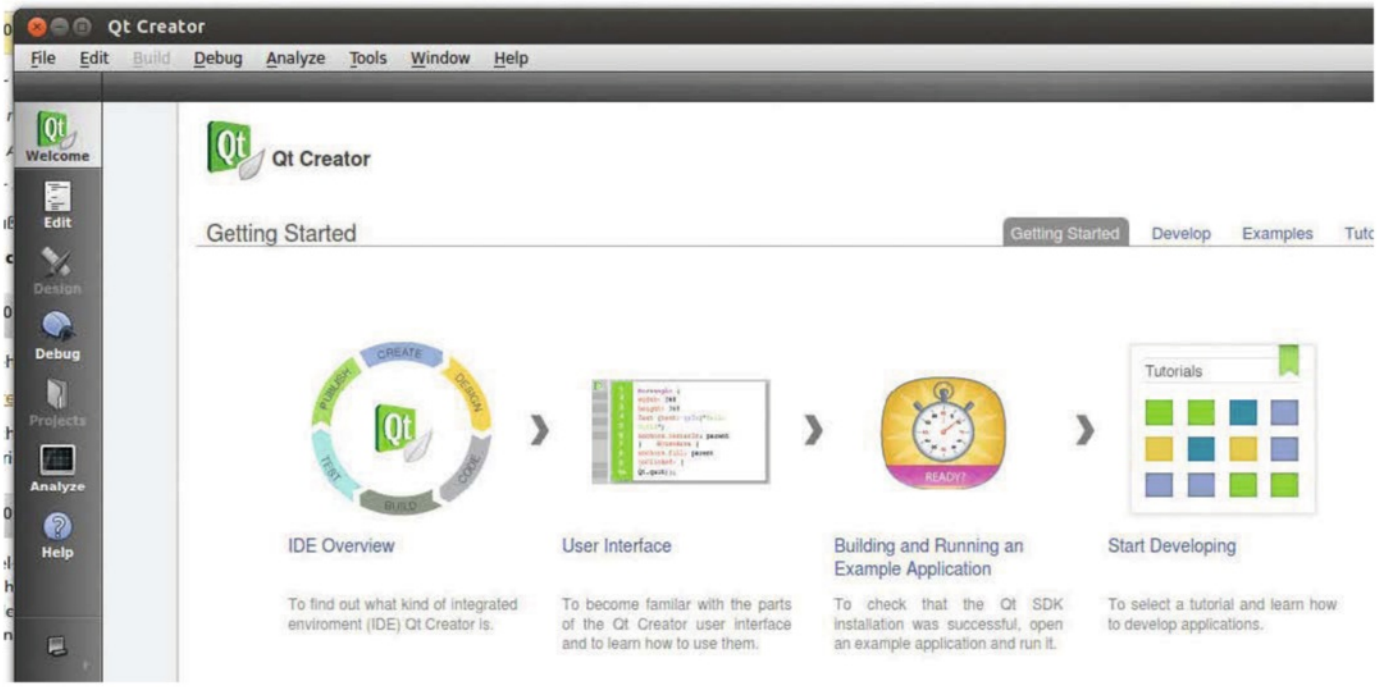
In addition to that, a legal trapdoor was established to protect the availability. It is responsible for the flood of updates which

Further reading...

planet.qt-project.org

qt-project.org/doc

qt-project.org/forums



After startup, Qt Creator shows a 'start pane' with some instructions for getting started

Qt: Write once, use anywhere

Get started with Qt Creator and use it to create a Hello World app

TUTORIAL

After starting a project and choosing where to store it, select Desktop on this screen

have shaped the framework's history: if the current commercial maintainer does not update the free version at least once a year, it is automatically placed under a very liberal open source licence.

Nokia purchased the framework with the intent to unify its various developer offerings. This project came to nothing. Qt is now owned by an IT consulting company named Digia. Even though the free licence has long been replaced by the LGPL, a commercial version remains available. Ports for iOS and Android are in development – Qt is available almost everywhere.

IDE à la Qt

Digia provides users of the framework with a custom IDE. Qt Creator works best when run in superuser mode. Start it by entering the following commands into a terminal hosted in **/opt/Qt/** – the soft asserts emitted are normal and do not point to mistakes in configuration:

```
sudo qtcreator
SOFT ASSERT: "i != -1" in
file ../../../../src/plugins/
projectexplorer/taskmodel.cpp, line
172
```

Installing Qt

Getting Qt up and running is really easy

Due to the ubiquity of the Qt framework, most Linux distributions contain a package containing the aforementioned IDE. However, this version tends to be well out of date – the safest and sanest approach is to obtain the latest version directly from the Digia download servers. As of this writing, the current version is 5.1.1 – the following steps are based on it.

The easiest way to install Qt can be had by visiting the URL **qt-project.org/downloads**. Then, click the option for the 'Qt Online Installer' which best fits your system. After the download is complete, open a terminal and execute the following commands:

```
sudo chmod u+x qt-linux-
opensource-1.4.0-2-x86-online.run
```

```
sudo ./qt-linux-opensource-1.4.0-
2-x86-online.run
```

This will start the automatic installer. It will provide sensible default values for all settings – for the average developer, just clicking Next repeatedly will provide a workable installation. The download itself can take up to 30 minutes, during which you can continue to use your system normally.

Qt Creator has a slightly unusual layout, which can best be understood by looking at the GUI in its default state.

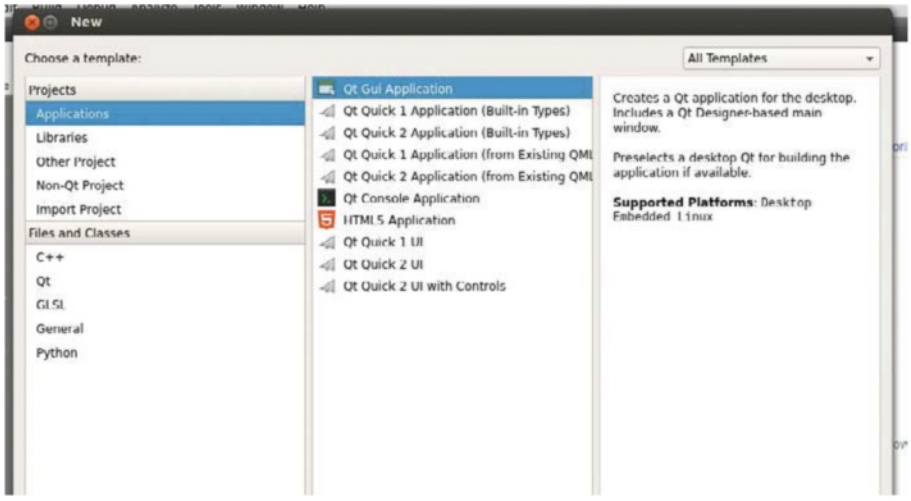
The IDE is subdivided into multiple submodules, which can be activated via the ribbon on the left-hand side of the screen. Click any of the icons to activate the corresponding view – it will show up in the remainder of the GUI. The bar at the bottom allows you to find out further information about compile processes and application status – by default, it is hidden to save screen real estate.

First steps

It is now time for us to start working on a little 'Hello world' application. Click **File>New File or Project** in order to open the Project Creation wizard. Then, select **Applications>Qt Gui Application** and click **Choose**. In the next step, the product will ask for a name and a storage location.

After that, a relatively important dialog shows up. Qt Creator contains a relatively advanced cross-compilation framework, which permits you to target multiple different versions and platforms with one click. For our basic project, just select **Desktop** – we will use this dialog more in later parts of the tutorial.

The 'Class Information' dialog is not significant and can be closed by clicking **Next**. Then, click **Finish** to start the generation of the project skeleton. Then, click **Play** to start the program – it will display the project skeleton in Edit mode.



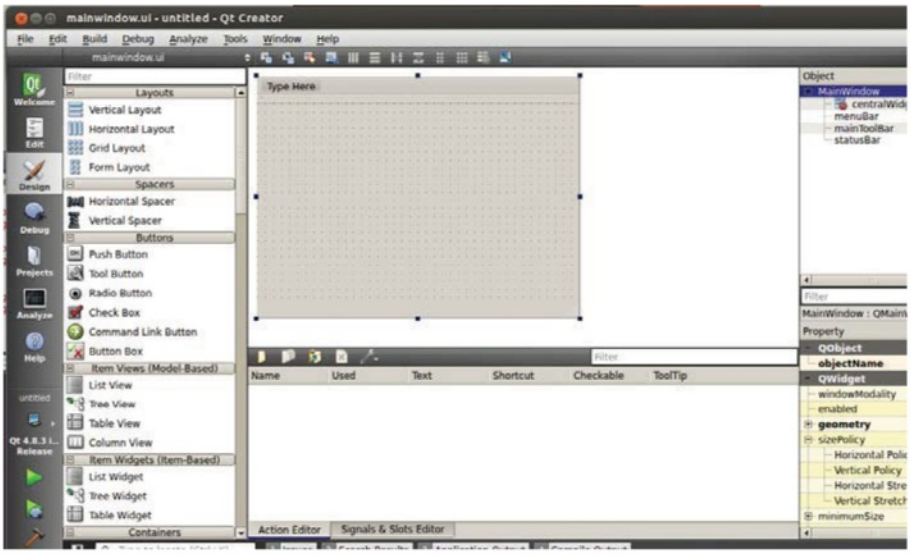
Qt Creator supports a large variety of project types

A new build process

When clicking the Play button at the bottom-left corner, the framework compiles and runs the application. In the background, a quite complex process takes place – understanding it is paramount to using Qt successfully.

A Qt-based application is compiled by the native toolchain intended for the operating system. The process is controlled by makefiles which, however, are generated automatically by a tool called qmake. It analyses the .pro-file of a solution and uses that information to set up the toolchain.

This cumbersome-sounding process offers a significant benefit to the developer: as the .cpp files are processed by the native compiler, they can contain any kind of code which the native operating system understands. It is fully possible to embed a native API call into an event handler or a similar portion of code – if you do not need



QtGui-based forms can be edited using a WYSIWYG editor

cross-platform compatibility, there is no need to provide 'protection' around the native code. Should you ever want to port your app to another platform, just use the C preprocessor to blot out the problematic code section.

The .pro file of our example can be opened by clicking it in the file list on the left side of the screen. It will look like this:

```
QT       += core gui
greaterThan(QT_MAJOR_VERSION, 4): QT ↵
+= widgets
TARGET = untitled
TEMPLATE = app
SOURCES += main.cpp\
    mainwindow.cpp
HEADERS  += mainwindow.h
FORMS    += mainwindow.ui
```

In principle, a .pro file contains a list of files and settings which are needed to build the product. Qt is made up of multiple modules – including the ones needed via the QT-Statement. The target- and template-Statements determine the type of binary which is to be generated. The HEADERS-, SOURCES- and FORMS-Blocks list the files of each type. When a new file is added, Qt Creator updates these sections automatically.

GUI from file

Qt currently contains two different GUI stacks, which can be used co-operatively. QtGui (Qt 5 renamed this module to 'widgets') uses a group of controls mapped to the native operating system. Qt 4.7 introduced a second system called QML, which uses a JSON-derived language to describe the modules making up the user interface.

Even though rumours pertaining to the death of QtGui tend to pop up every now and then, Digia has repeatedly confirmed that it is strongly committed to keeping the system around for the foreseeable future. Using QtGui tends to bring results quicker. As the base project we created was based on QtGui, we will continue to use it during the rest of the tutorial.

QtGui-based forms are created entirely in source code. However, Qt Creator provides a WYSIWYG front-end which simplifies the management of the user interface. Double-click any .ui file in the project overview in order to activate the design view, as pictured above.

The toolbar on the left of the screen contains a variety of controls, which can be dragged onto the form in the middle. The list at the bottom right shows the properties of the currently selected control. The tree view above it provides an overview of the structure of the user interface.

Going cross-platform

Taking our app to another operating system is really easy

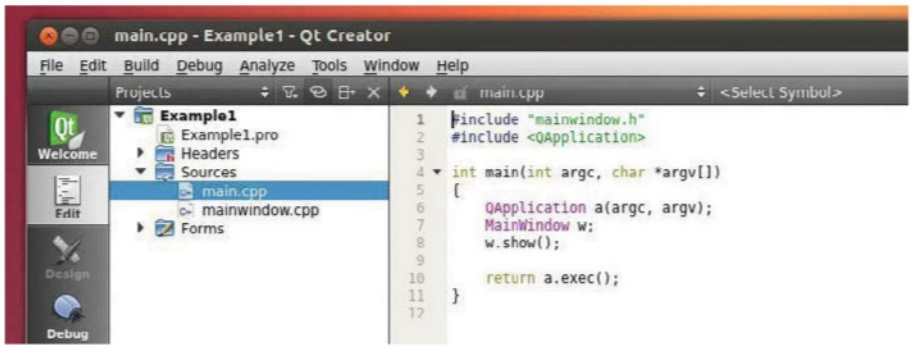
Currently, we have no 'non-framework' code, so there are no obstacles from a code point of view. Even though Qt Creator contains decent cross-platform capability, it tends to be limited to compiling within the same platform. This means that a UNIX-like system could easily create a binary for a different UNIX-like system running on a different processor type (producing an executable file for Windows requires considerable effort).

When targeting a different desktop operating system, bringing up an instance and installing Qt Creator, there is the fastest way. Digia provides complete installers for Windows, Mac OS and various flavours of UNIX. Just copy the project files over, open the .pro file and start a compile process.

The situation in the mobile space is a bit different. Here, cross-compilation is a matter of necessity. The choice of desktop operating system is sometimes made by the manufacturer of the device in question. BlackBerry 10 and Android can be programmed with any desktop operating system, whereas Windows Phone and iOS tend to require a device running the 'corresponding' desktop operating system.

During compilation, a program called uic (User Interface Compiler) will transform the .ui files into header files containing the code needed to generate the actual form. In the case of our skeleton program, the file will be called **ui_mainwindow.h** (it can be found by opening the file **mainwindow.h**, right-clicking the relevant

> **Qt Creator provides a WYSIWYG front-end which simplifies the management of the user interface**



The source code of main.cpp is shown with syntax highlighting

inclusion and then instructing Qt Creator to follow the declaration of the symbol).

Its structure will be similar to this code snippet:

```
class Ui_MainWindow
{
public:
    QMenuBar *menuBar;
    QToolBar *mainToolBar;
    QWidget *centralWidget;
    QStatusBar *statusBar;
    void setupUi(QMainWindow *MainWindow)
    {
        if (MainWindow->objectName().↵
isEmpty())
            MainWindow->setObjectName( ↵
QString::fromUtf8("MainWindow"));
        MainWindow->resize(400, 300);
        menuBar = new ↵
QMenuBar(MainWindow);
        . . .
```

ui_*.h files are generated automatically whenever the corresponding .ui file changes. Therefore, it is not recommended to modify them by hand in any way; doing so will lead to unreliable and undefined project behaviour. Furthermore, it is recommended to keep them (and any moc files) out of version control systems: the frequent changes tend to overload the servers quickly.

Coding, for real

Now it is time to take a look at the source code. The entry point is in a file called **main.cpp**. The method found there is a standard construct. It starts out by instantiating the **QApplication** class which contains the event loop and other elements needed for program operation and OS integration. In the next step, an instance of the **MainWindow** is created and pushed onto the screen. Finally, **exec()** is invoked: it will return only when the program is to be terminated:

```
#include <QApplication>
#include "mainwindow.h"
int main(int argc, char *argv[])
{
    QApplication a(argc, argv);
    MainWindow w;
    w.show();

    return a.exec();
}
```

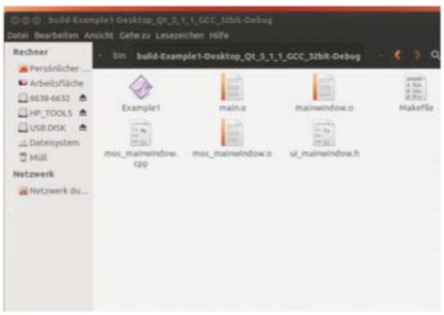
The form itself is made up of two files. The c++ class contains a more-or-less default constructor which invokes the **setupUi** method of the **ui** object. Other than that, it does not contain much of significance:

```
#include "mainwindow.h"
#include "ui_mainwindow.h"
MainWindow::MainWindow(QWidget *parent) :
    QMainWindow(parent),
    ui(new Ui::MainWindow)
{
    ui->setupUi(this);
}
MainWindow::~MainWindow()
{
    delete ui;
}
```

The actual intelligence of the form resides in the header file. It is derived from **QMainWindow**, and furthermore contains a pointer to the aforementioned **ui** object. It is created by uic, and resides in the aforementioned ui_*.h file.

In addition to that, this listing also demonstrates the use of the **Q_OBJECT** macro. It is required in all classes which are derived from a QObject-derived class – its use will be discussed in the next part of the series. For now, it suffices to say that it must be there to avoid compiler errors.

```
#ifndef MAINWINDOW_H
#define MAINWINDOW_H
#include <QMainWindow>
namespace Ui {
class MainWindow;
}
class MainWindow : public QMainWindow
{
    Q_OBJECT

public:
    explicit MainWindow(QWidget *parent = 0);
    ~MainWindow();

private:
    Ui::MainWindow *ui;
};
#endif // MAINWINDOW_H
```



Various files are produced during the compile process

Perfect for every scenario

From a commercial point of view, using Qt is a no-brainer. Being able to port your application quickly lets you reach new customer groups with little effort. Should the need arise to bring your product to a mobile operating system, the framework is already there.

Using Qt, however, also makes sense for a non-commercial application which will not be ported anywhere. Qt's compact and expressive interfaces minimise the time needed for implementation; features such as the signal-slot system and the 'garbage collector' ease development.

In conclusion, it can be said that learning and using Qt always makes sense. Once the learning curve has been climbed, enormous time savings can be achieved. Articles in the following issues will introduce you to new aspects of the Qt – stay tuned!

PyConUK 2013: putting education on track

We went back to Coventry's prestigious Technology Park for another Python community conference. This year education played an even more integral role in the proceedings...

Larry Hastings, the release manager for Python 3.4, flew in from the States to take part in PyCon UK's Raspberry Jam

With Coventry University's TechnoCentre as a backdrop and some of the greatest minds in Python programming in attendance, you'd be forgiven for assuming PyCon suffers the same stuffy, awkward atmosphere that haunts the halls of many of the world's developer events. You'd be wrong. We could wax lyrical all day about PyCon UK's fantastic reputation as one of the best community-driven conferences in the country, but we won't bore you with the details. Suffice it to say that we were met by one of the most welcoming and inclusive gatherings of like-minded geeks we've encountered and we highly recommend it to anyone with an interest in Python.

Though organised by community volunteers, there's nothing amateurish about this annual event – with over 300 attendees to cater for, organiser John Pinner and his team always have a mammoth task on their hands. As you'd expect with sponsors including PythonAnywhere, Bank of America, Bytemark, Riverbank Computing

> "It's the lack of syntax that makes Python excel... [child programmers] can get on with being imaginative"
> Ben Smith, computer science teacher

and 2nd Quadrant (among others), the gathering was very well catered for and offered refreshments, dinners, breakfast baps and more than a few ales to its patrons.

The event started, as usual, with a gracious introduction from John Pinner, while the proceedings were helmed by Zeth Green, who did an utterly fantastic job of the least enviable role, which included herding, stewarding and generally jiggling the schedule to keep everything on track.

Education, education, education

Speaking of tracks, as was the case last year, PyCon UK had a very active educational track accompanying the usual mix of talks, socials and sprints. Since Python's common-sense syntax and human-readable coding style is as beginner-friendly as is possible, the coming together of teachers and programmers for the betterment of UK computer science education makes a lot of sense.

You only need to look at a simple 'Hello World' comparison between Python and C++ to reach the same conclusion.

For C++ there's a long and merry dance to output this historic sentence to the console:

```
#include <iostream>
using namespace std;

int main ()
{
  cout << "Hello World!";
  return 0;
}
```

For Python, however, everything is neatly wrapped up in a simple command:

```
print("Hello, World!")
```

Python does a brilliant job of peeling back the layers of obfuscation to offer those writing code a very clean and transparent work environment. For those learning to program for the first time (including those in the education system), the advantages are greater still. Python's simple syntax refuses to remove the learner from the constructs that form the backbone of any programming language. Arrays, loops, classes, generators, list comprehensions and the myriad other vital ingredients aren't clouded by decades of meandering development. Python is logical, concise and free of baggage, which is probably why it's used by the likes of Google, NASA and Disney to do some truly incredible things.

We were fortunate enough to latch onto Nicholas Tollervey quite early on in the event. He's a member of the Python UK organising committee and helps to run the event, and until recently was a Python programmer for *The Guardian*. Before becoming a Pythonista, though, he was a teacher. As such, he's extremely well placed to help engage the Python community to find new ways for programmers to work with teachers, many of whom are short of skills and the budgets needed to acquire them.

Is Python the right tool for education?

"Absolutely," says ex-teacher and Python UK committee member Nicholas Tollervey. "It strikes me that when you begin to program as a child using something visual like MIT's Scratch is the way to get into it, because you can literally see the loop happening and watch the little cat moving around the screen. At some point, though, you're going to have to sit down and use a real programming language. Python is a full-featured programming language that people like Google, Disney and NASA use for important applications and it's actually very easy to learn; but more interestingly, it's very easy to bridge the gap between something like Scratch and Python, so it's a great next step into a modern, full-featured language."

Ben Smith, a computer science head added: "It's the lack of syntax that makes Python excel; that's what seems to stumble a lot of the kids: debugging their code is a pain, and if it's a missing curly bracket, or you put the wrong kind of bracket in or you've not put a semi-colon, it just frustrates them. So if you can remove as much syntax as possible, you're getting rid of a lot of the debugging issues, and they can get on with being imaginative and enjoying what they're doing."

Computer science teacher Ben Smith shows off a task set to his students utilising Minecraft Pi

Ex-teacher and member of the organising committee for PyCon UK, Nicholas Tollervey, was a real driving force for the PyCon UK educational track

Alan O'Donohoe (left) speaks to Bank of America employees and Pythonistas about his work on the Raspberry Jam formula, which is entirely not-for-profit

"We've been using devices like the Raspberry Pi and games like Minecraft Pi to change computing education from helping children use Microsoft Word to learning how to program in Python," he said.

"At last year's PyCon we had a teachers track, which was quite small, but really quite successful. Some of the talks that we've seen during the course of this year's PyCon were directly inspired by things that happened last year."

Tollervey was referring to the two Turtle library talks by Mike Sandford and Simon Davy, in which both parties took different approaches to bettering Python's now ageing educational library, both with great success.

"After last year's event they went away, collaborated with teachers and built something in an effort to create more engaging material that could be used in schools."

Served with a side of Pi

Taking things further this year, the educational track culminated with a Raspberry Jam, where Python programmers and teachers join forces to educate and entertain a targeted age-range of children interested in exploring computer science by hacking and programming with the Raspberry Pi. It was a great way for the teachers, who had spent the previous day picking the brains of some of the UK's leading programmers, to test new ideas on young volunteers. Tollervey said: "We had teachers come both this year and last, so we thought, what else do we need? What's the next step? So this year we brought along children as well. We've got about 35 kids here with their parents and we're having a Raspberry Jam with our friend Alan O'Donohoe."

O'Donohoe (otherwise known as the 'Jambassador') has long been a key figure in pushing the Raspberry Pi as an educational tool. After sitting down with Nicholas, Alan and some of the teachers at the event, it was evident that there are many issues facing educators, but that Python and the Raspberry Pi can play intrinsic roles in securing the next generation of computer scientists.

The event saw a wide range of fun and games for the kids, including Minecraft Pi, a quadcopter (controlled from Minecraft Pi) and even a few Raspberry Pi robots. As O'Donohoe explained during a brief chat amid the mayhem, linking the Raspberry Jam with PyCon UK provided a unique chance to show developers the opportunities that exist for supporting ICT education in the UK.

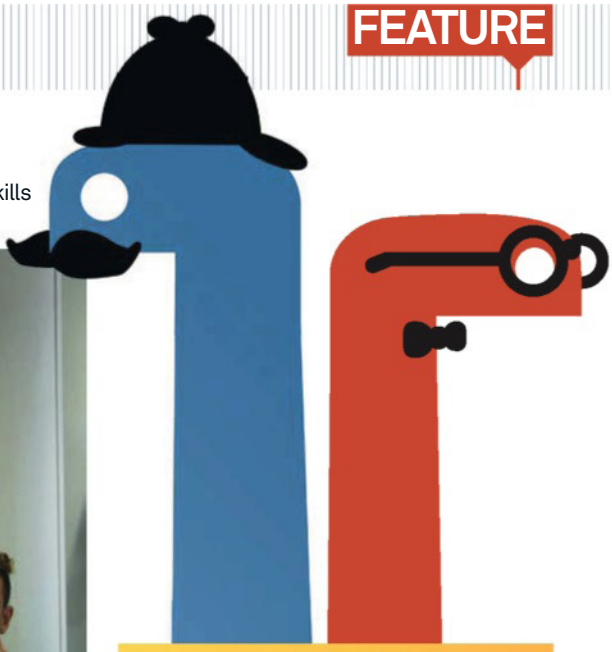
"Many of the developers were encouraged and surprised to see the high level of challenge that the children were working at," said O'Donohoe. "It was also noticeable that there was a 50/50 gender balance in our participants at the Jam – something that's not true in the developer community."

While decades too late for many of today's young professionals, the UK government has recently announced the new ICT curriculum.

Putting education on track

Education was a focus for this year's PyCon UK event

FEATURE



Zeth Green shows off his programming skills as part of the Raspberry Jam show and tell

"My daughter is learning how to build a rocket in Python using Minecraft"

Nicholas Tollervey, member of the PyCon UK organising committee

We asked Tollervey for his view of the proposed changes that will see children as young as five challenged to write their first algorithm.

"I welcome the accent on computer science, programming and thinking computationally. That was what it was like when I was at school – I had a BBC B computer and I learned to program using BBC BASIC. ICT education has gone downhill from that time, so it's great to see this much needed change to the curriculum."

It's also something that directly affects Tollervey, who has children of his own, all of whom were attending the Raspberry Jam.

"My daughter is learning how to build a rocket in Python using Minecraft on the Raspberry Pi. She don't realise it, but she's pair programming with one of the UK's top developers, which is pretty amazing. One of my sons is building another game and is working with a Python core developer. They're all having a great time in there and they've got some of the brightest minds in computing helping them."

As our brief interview concluded, Tollervey was quick to convey bigger and better plans for next year's PyCon UK event.

"We hope to get more teachers. The strategy is that programmers aren't teachers, so we haven't got the expertise to work with kids in the classroom – it's teachers that affect the most change. By reaching out to teachers and showing them the tools, giving them confidence and showing them what it's like in the industry, they can translate that into what they need to do in their own classrooms."

Raspberry Jam attendees brought more than their children – RasPi robots came too

The fear factor

Computing is making a return to the school curriculum 20-plus years after schools effectively abandoned it. If you are in your early-to-mid-thirties you're technically part of the Microsoft generation – a shuddering thought we should all be afraid of.

While it's wonderful to see bare-metal computer science making a comeback (and it's a boon for Python), there's currently little budget or training to support teachers. Vikki Dodd, an ITC teacher from Preston who attended PyCon UK's education track, spelt out the challenges and issues facing schools around the country.

"Teachers have to know about algorithms, logic and some form of iteration," she told us. "This kind of language is seriously frightening teachers – many of them, especially in primary schools, have no computing or even ICT qualifications whatsoever. [There's] nobody in entire schools that has them.

"A lot of teachers are embracing the new curriculum, but [have] no formal training and the amount of funding available within the schools is minimal. My budget last year for the entire computing department as [a] whole was £1,500. From that I had to try and fund the continued professional development (CPD) of five members of staff. That equates to one short course to one teacher and nothing more."

In short, UK educators need your help. So if you're a keen programmer, you can help make a difference in a local school by registering your interest with Computing at School (**www.computingatschool.org.uk**) or the STEM ambassador program (**www.stemnet.org.uk/content/stem-ambassadors**).

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How we review

Our experts thoroughly test the kit and grade it using the following criteria

Avoid at all costs

A designer/developer's bad day

Good but could do better

Get this. It won't disappoint

Software or hardware nirvana

"It's powerful, portable and has a huge range of suitable roles that it can easily pull off"
MintBox 2

Reviews

Group Test


Rhythmbox

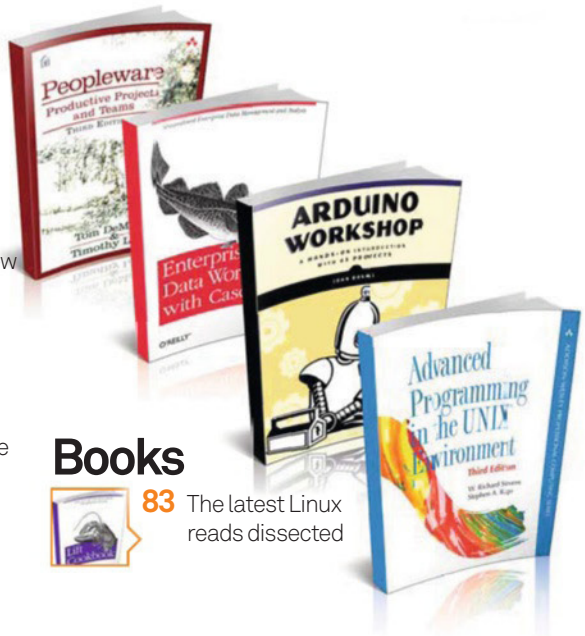

Audacious


Clementine


Banshee

Hardware

Software



Books

GROUP TEST

Music players

We find out the best way to organise and play your music library by testing out the top four music players available on Linux

Music is the soundtrack to our lives, and one of the most important pieces of software on any PC or laptop is a good music player, one that can easily manage an ever growing collection of media. Filtering through music by album, genre, artist or more is a must these days, along with user-created and auto-generated playlists as well as connection to online cloud storage and music streaming services.

With the recent release of Clementine 1.2, one of the most popular media players, we've decided to look at it and its competitors to see if it's really the best media player, or if there are others that deserve your attention. We'll be looking at their ability to play different types of music, the information they can get, the layout and the general selection of features.

Some of these may not beat your favourite online service – for that, try using Nuvola as an alternative for pure streaming services, allowing you to use keyboard hotkeys and not rely on your browser.

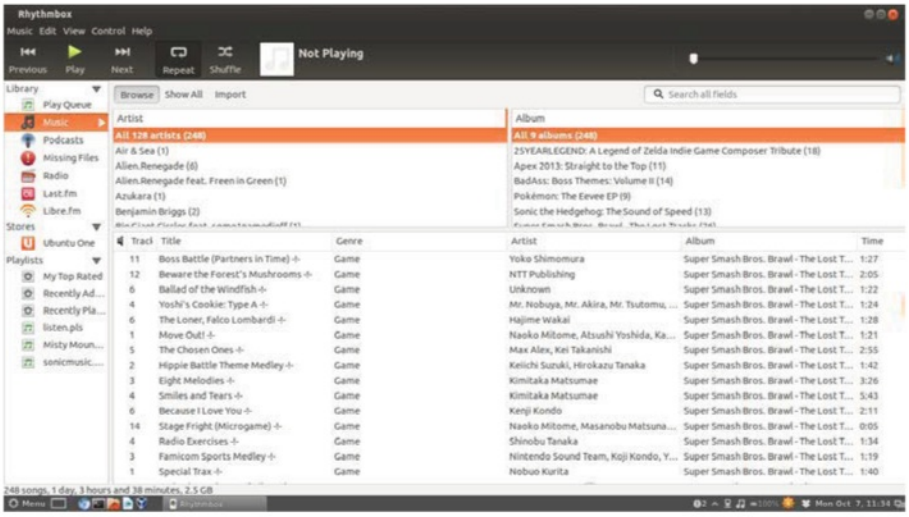
Rhythmbox

The Ubuntu default is a Linux mainstay, but how does it compare?

There was a bit of a kerfuffle a year or so back with Rhythmbox. Soon after Ubuntu One started streaming music, Canonical opted to switch to Banshee for the next release of Ubuntu. These kinds of changes happen everyday in Linux. However, what was more surprising was the instant backtracking by Canonical, reinstating Rhythmbox as the default music player in the following release of Ubuntu – returning with better music streaming options.

Rhythmbox is a great default music player for a number of reasons. It has a straightforward interface with nice, big, standard buttons that stand out so anyone can use it. The entire music library is accessible down the side, along with a handful of basic streaming services other than Ubuntu One, and a dedicated Radio and Podcast list. Playlists are split up from this main Library, although these only include playlists you've created and automatic ones such as recently added or played music, with no smart recognition.

Playback is absolutely fine, with files, folders and selections being easily added to the now playing queue thanks to great integration with the standard file manager. There's also good integration with notification areas, particularly with GNOME-based volume controls, allowing you to reduce the number of icons and control music and volume from one place.

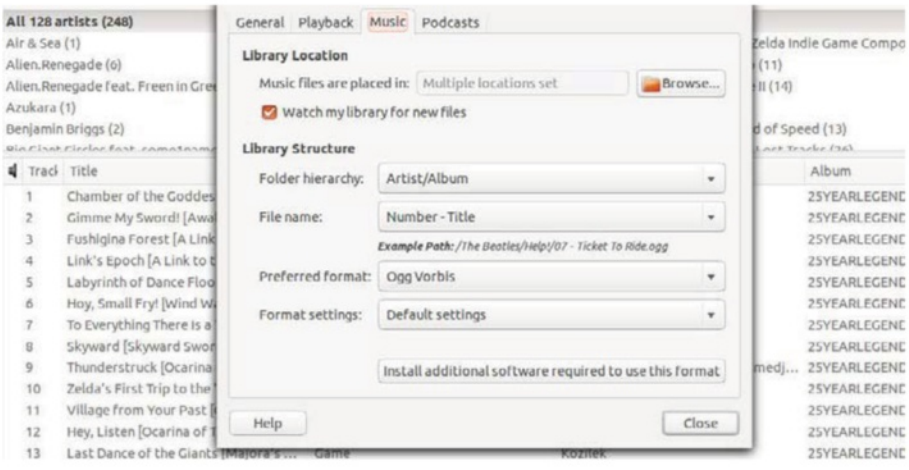


The interface is simple yet fully featured

So pretty basic but good, then. Unfortunately, that's about it for Rhythmbox. There's not a huge amount of customisation available for the interface – either for the layout or the way it generally works. Compared to Clementine, which has a huge selection of music streaming services available, access to Last.fm, Libre.fm and Ubuntu Music is just not enough for Rhythmbox. It needs more.

Overall, Rhythmbox is a great standard music player. Music is very well organised and easy to search through, with the multi-pane library window aiding in this. Creating playlists and play queues on the go is nice and easy, and playback is easy to control. Smart playlists are noticeably absent, though, as are the aforementioned range of online streaming services. If you're using it, perhaps consider an upgrade.

> "There's not a huge amount of customisation available for the interface"



There's not a whole lot of customisation in Rhythmbox

SCORES

Playback	Pause, skip and more via notifcation bar, media buttons or the interface	7
Interface	A nice straightforward interface with good OS integration	9
Management	Great music filtering and playlist handling with a good search function	8
Online	Very few online services can be streamed, other than normal radio and Last.fm	3
Overall	**Rhythmbox is definitely good, but it's in sore need of a big update to make it more relevant in a world of online music**	7

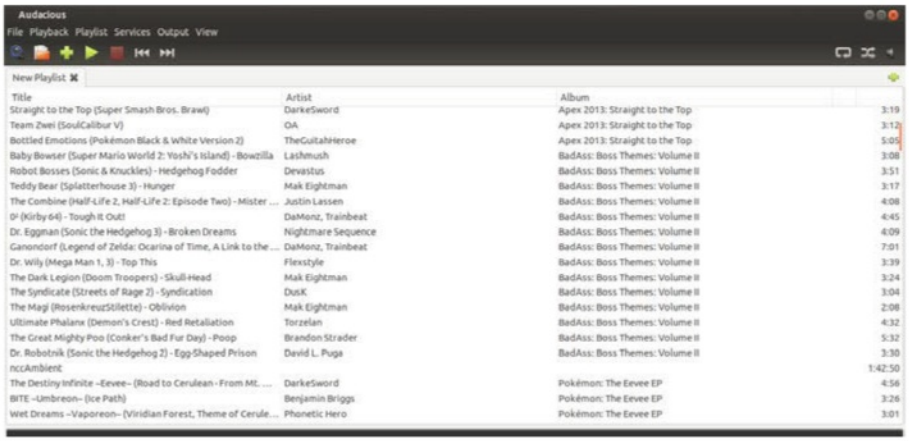
Audacious

Lightweight yet with a surprising number of features

Audacious is the only media player in this group test that can be described as lightweight – and in fact like many lightweight apps, it's made that way in mind. Still though, it's a very popular music player and music manager, thanks in part to a good selection of features that make it more than just a basic music player.

Audacious's interface is extremely simple, with a single pane to list all available media, listed by album by default. Music can be easily added, with a standard folder being used to check regularly for any more content for Audacious to add to your library of media. Interestingly, playlists and play queues are handled in separate tabs from the main library, keeping the interface a little cleaner and allowing you to have a specific layout of your favourite playlists without needing all of them on show.

The search function is a bit odd, though. Instead of an omnipresent search field on the interface, a separate column needs to be opened up from the menus. The results from the search are not displayed very well, with what seems to be a random mash of authors, albums and songs included in the results. This highlights a small problem with Audacious: while the interface is quite neat and minimalist, it makes looking for the music you want to play a bit of a chore. You're much better off creating playlists in other music players to then use in Audacious, or simply add them from the file manager. There's at least some decent integration with the desktop environment once you've got everything playing, though.

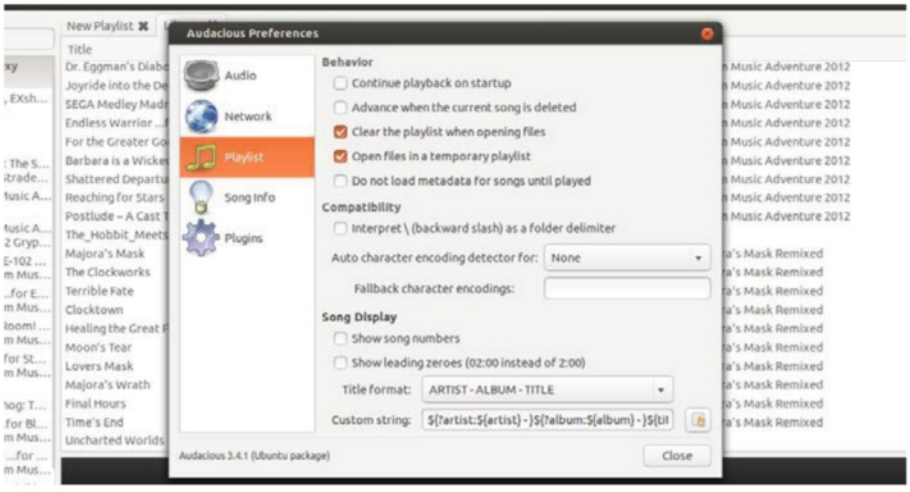


The layout of media can make it tricky to find anything

However, due to its lightweight nature, there are no smart playlists, and there is no way to connect to online services. This is its major downfall compared to the rest of the applications in this test, as with ever growing music libraries in multiple locations, your music may not be all available on your PC or laptop, or even your home network.

At the very least, Audacious is very customisable. From the behaviour of what it plays at startup to how it handles playlists and such, there's an eye for making it convenient or keeping it lightweight. At least in that regard, it performs very well.

> "There are no smart playlists, and no way to connect to online services"



The search function is not the best, but Audacious is highly customisable

SCORES

Playback	Plays media perfectly, but lacks auto-generated playlists due to being lightweight	6
Interface	A simple and interesting tab-based interface, although search could be better	8
Management	Due to the simple interface, actually looking for your media is tricky	6
Online	No online services offered whatsoever	0
Overall	**Audacious is fine as a lightweight music player, but for proper media management and integration you'll need a bit more**	**5**

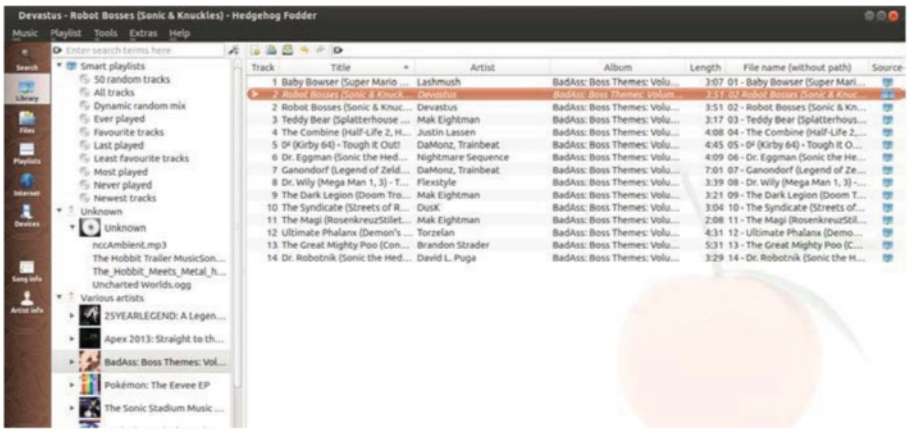
Clementine

A Linux favourite, how is the latest Clementine player?

Clementine is based on the KDE music player, Amarok, but with a few improvements and a much better interface. It's quickly become a very popular media player and the latest version, 1.2, has arrived with a whole host of great new features. These are sure to attract new users while appeasing die-hard fans who still want to use their favourite media player in a changing landscape of music consumption.

First of all, Clementine now has access to a lot more music streaming services than before, with new additions such as Dropbox and Ubuntu One joining the already impressive list of existing ones. These include Google Drive, Spotify, SoundCloud, Last.fm and Grooveshark. You can easily search within the free services using the built-in Clementine search functions, and you can log in to do the same with the account-driven services such as Spotify and the cloud storage ones. These settings are easily found in the preferences menu under a different section to the vast wealth of customisation options that Clementine offers.

Through these options you can change just about every way Clementine behaves, from simple things like how it might fade between tracks, to tweaking the transcoding settings or even setting a Wii Remote as a remote control device. New in Clementine 1.2 is the ability to use an Android device as a remote, a feature which has been a long time coming. However, instead of using a basic HTTP interface, it uses a special app to make it work.

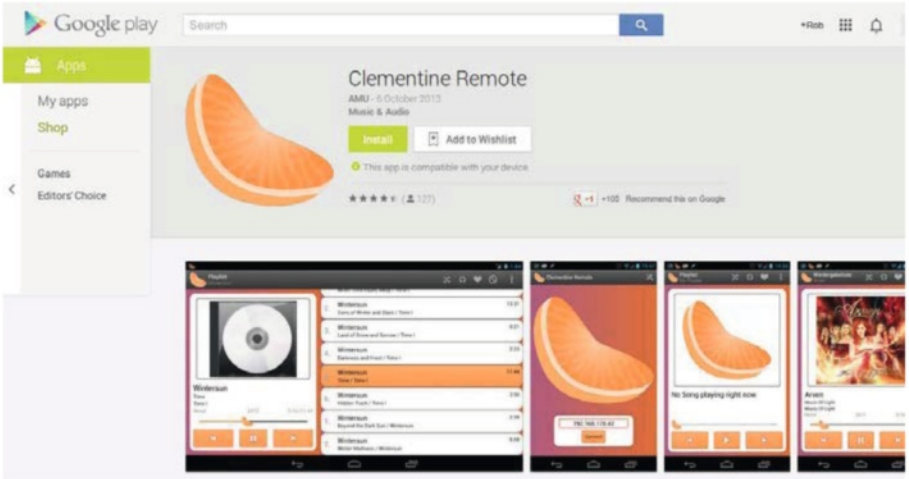


Clementine has everything but the Kitchen Sink. It even has the Hypno Toad

Playback is fantastic, with a special Clementine icon ticking down to the end of the song, and showing a play symbol so you know it's actually going. While you can control Clementine from here, you can also control it from the usual volume control icons if you're using the right desktop environment.

Clementine basically has it all, then. Its smart playlist feature, the dynamic random mix, isn't quite as good as some online equivalents, but it's a lot better than any of the other players in this test. It also has the greatest selection of online services it connects to, is the most customisable and makes finding your music easy.

"You can change just about every way Clementine behaves"



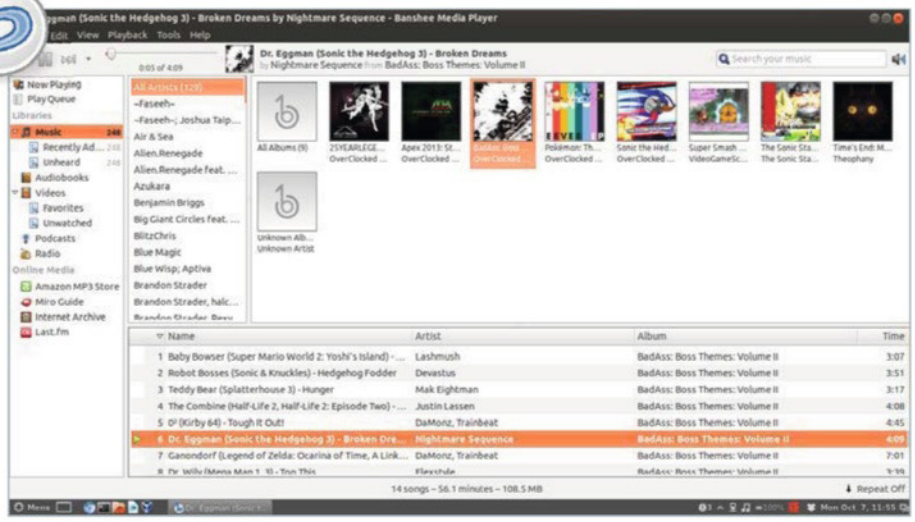
The Android app offers better control than some HTTP interfaces

SCORES

Playback	Makes playback as easy as it can be, short of dedicated buttons on the notification area	9
Interface	The interface contains a lot, but does the best it can for the amount of features	8
Management	Easy to navigate and find media, although some of the online services could work better	9
Online	Connects to everything you would probably want to use bar Pandora and Google Music	10
Overall	An amazing piece of software that lets you do just about anything you'd want to do with all of your music	9

Banshee

Similar to Rhythmbox, and not as popular as Clementine



The Banshee interface is very nice

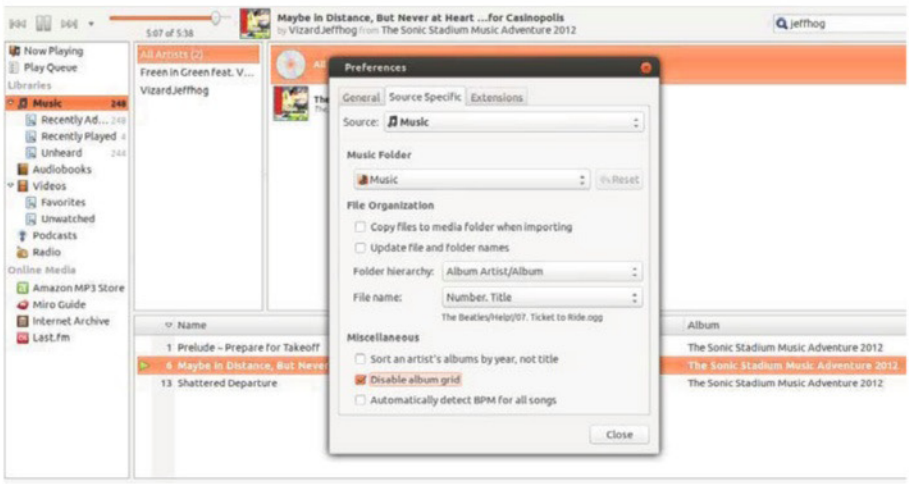
As mentioned in the Rhythmbox review, Banshee was the one-time default audio player for Ubuntu, replacing and then being usurped by Rhythmbox. Due to this, you'd be forgiven in thinking that they're incredibly similar applications – and in some regards they are. They both employ a similar three-pane layout for your media, and they both include a column down the side for navigating your media, videos, podcasts and online services. At the core, they also both run off GStreamer, which is a great media back-end and allows the two to play just about anything with the right codecs installed.

The interface for Banshee is nice and easy to use, and very responsive. Search is instant, bringing up results as you type, and the way results are listed is conducive to finding the tracks, album or artist you're looking for. The album pane on the main interface has thumbnails of the album art instead of a list – although the grid effect can be disabled if you wish. It all works very well and, like all the others, integrates just fine with the desktop environments that allow for playback options via volume controls.

Customisation wise, there's not a whole lot more than Rhythmbox. You can't even set a specific interval or time for the music library to update. These kind of features are sorely missing, especially compared to Clementine and Audacious which have a whole host of different features and options that can help you streamline the experience. At the very least, there's a fairly rich plug-in system and you can turn off some of the features of Banshee you don't wish this way, making it much more lightweight than it is by standard. It's through these extensions that the online services are included in Banshee – like Rhythmbox, though, there's only a handful like Last.fm and Amazon. There are a few other, community-built extensions, but none to challenge the features of Clementine.

So overall, Banshee is pretty good. While it's easy to compare it to Rhythmbox, it's generally a little better, with better plug-in support that allows it to be more lightweight if you wish, and a slightly cleaner and informative interface. It's no Clementine, though.

> "Search is instant, bringing up results as you type"



Extensions give Banshee a lot of its features, and turning these off is the main way to customise the software

SCORES

Playback	Good playback options, but lacks its own dedicated notification icon	7
Interface	An easy-to-use interface that is laid out in a logical manner	9
Management	For local content, it's a great way to keep track of all your media of any type	10
Online	Limited online options, and it's only minimally extendable	4
Overall	**Banshee is a great media player that we'd be very happy to use if we didn't have access to any online services**	**8**

In brief: Compare and contrast our verdicts

	Rhythmbox		Audacious		Clementine		Banshee	
Playback	Playback is handled fine throughout the interface and OS integration	7	Simple playback options and some customisation for them	6	Clementine has many ways to manipulate playback that can be utilised	9	Standard, but good, playback features throughout	7
Interface	A nice, clean layout that makes it easy to find and organise media	9	A very simple interface that lists all your media	8	The interface is a little cluttered, but does its best to make it work	8	A well laid out, easy-to-understand interface	9
Management	Media is well split up, and playlists are easy to make	8	Not very easy to find specific songs or artists	6	Easily managed music, playlists, online media and more	9	Local music is very easy to mind and organise	10
Online	Very limited selection of online services such as Last.fm and Ubuntu One	3	No online services are accessible via Audacious	0	Connection to just about every major online music and cloud storage service	10	Mildly extendable online features, but still only a limited selection	4
Overall	**Rhythmbox is a decent enough media player, but it needs some more features**	**7**	**Audacious is great for a lightweight audio player, but it's just not enough**	**5**	**Clementine has just about everything you'd want from a media player**	**9**	**Banshee is a good standard media player for all your locally stored music**	**8**

AND THE WINNER IS...

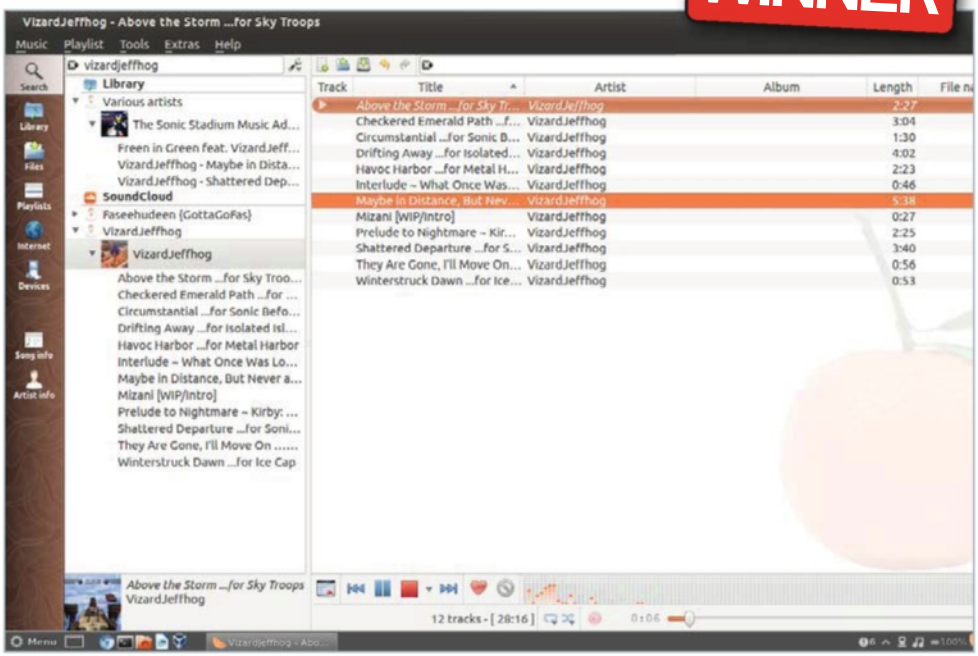
Clementine

Clementine is really the clear winner in this test, being the best in just about every regard thanks to a fantastic Amarok base, a very smart interface that integrates all modern ways of listening to music, and a great selection of online services. Wherever you like to listen to your media, Clementine can help you get it on your Linux system and easily control it via a number of graphical methods, or even keyboard shortcuts and hotkeys.

The other audio players don't really come close to it. Audacious is more focused on being lightweight, which while having its place, doesn't make it at all competitive compared to Clementine's wealth of features. Banshee and Rhythmbox are roughly on the same level with each other, and need a serious upgrade in terms of access to online services to really stay relevant.

For now though, Clementine really is the best application for listening to, and managing, your music.

Rob Zwetsloot



Clementine can search through local and any online media you've set up at the same time

PERIPHERAL

The FUZE Powered by Raspberry Pi

£179.99

Can an add-on which channels the heyday of the BBC Micro be just what the Raspberry Pi needs to succeed in schools?

Pros
Solidly built and with clever software, the FUZE is a great way to adapt the Raspberry Pi for educational use

Cons
It's an expensive accessory if you're not VAT-registered

The brainchild of Jon Silvera, The FUZE Powered by Raspberry Pi is styled after the microcomputers of the 1980s – in particular the Acorn BBC Micro, which directly led to the development of the ARM instruction set that powers the modern Pi. A hefty chunk of metal, the FUZE encases the Pi while providing access to the majority of its ports: Ethernet, audio, HDMI, a single USB port and access to the SD card slot and micro-USB power connector are all provided at the rear, but sadly the composite video, DSI and CSI connectors aren't broken out – meaning those who want to make use of these features will need to modify the case themselves.

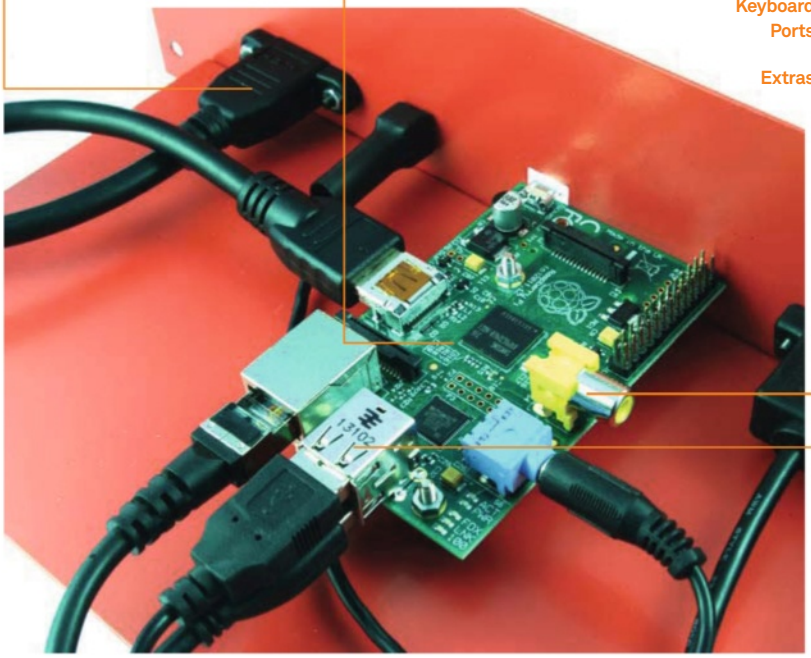
The FUZE is more than a case, however. The unit includes an integrated 88-key island-style keyboard, which connects to one of the two USB ports of the bundled Raspberry Pi Model B. A recessed tray at the top also holds a GPIO breakout board and room to attach a bundled mini-breadboard for easy wiring, When bought in its full bundle form, the FUZE even includes a wireless mouse and branded mouse-mat – meaning the buyer need only provide an HDMI display in order to get started.

An SD card included in the kit goes still further to evoke feelings of nostalgia for the microcomputer boom of the Eighties. Pre-flashed with a customised Raspbian install, the SD card includes a programming language called FUZE Basic, which – like BBC Basic of old – sits the user at a black screen with a white, flashing cursor. Unlike classic

The FUZE Powered by Raspberry Pi

RasPi case, keyboard and much more

REVIEW



Technical specs

Operating system	Customised Raspbian with FUZE Basic
Processor	Raspberry Pi Model B (also available with Maximite microcontroller)
Dimensions	330 x 240 x 73mm
Weight	1653g (excluding PSU)
Expansions	1x protected GPIO breakout board, bundled mini-breadboard
Keyboard	Integrated 88-key island-style
Ports	10/100 Ethernet, 1x USB, SD, power, 3.5mm audio out, HDMI
Extras	Mouse-mat; wireless mouse; reference manual; PDF project cards; electronic kit with flexible jumpers, fixed jumpers, red/green/blue LEDs, eight-segment LED, piezo buzzer, momentary switches, batteries

Basic interpreters, however, FUZE Basic includes a handy integrated text editor for creating more complex programs without the pain of line-by-line editing.

All the old classics – 10 Print "Hello", 20 Goto 10 – work fine, but FUZE Basic has a trick up its sleeve: direct access to the Pi's GPIO header. Using a syntax borrowed wholesale from the Arduino project, users can quickly write programs to read or write data to the GPIO pins.

Sadly, making use of FUZE Basic can be awkward: the bundled manual is a mere reference guide to the commands available, although a full user guide is in the works and will be provided as a free download. While PDF project cards – written with secondary school pupils in mind – provide a much more friendly introduction to using the language, only four of a planned 16 were finished at the time of writing.

These are minor points, however: the FUZE is a work in progress, and its creator has promised to both revise the existing cards and to publish the remaining cards for free download as quickly as possible, which will go some way to improving the usability of the FUZE.

The biggest problem with the FUZE is one of price: while the Pi itself costs just £30, it is often bought in starter kits costing around £80 which include all required accessories bar the monitor. The FUZE, meanwhile, costs a whopping £179.99 – and while schools will be able to deduct the VAT and negotiate educational discounts, that's a premium that may put it out of reach of home buyers. Savings are possible, however: the kit can be purchased without the bundled Pi at £129.99, or as a bundle of just case, PSU and breadboard for £89.99. The cheapest option, meanwhile, is to buy the case alone for £69.99.

The biggest defence of the pricing, however, is in Silvera's commitment to local manufacturing: like the Pi, which is produced in Wales, the FUZE is a UK product through and through, with only the keyboard and mouse coming from further afield.

Gareth Halfacree

Summary

The FUZE is undeniably expensive for anyone who can't claim the VAT back and there is still considerable work to be done on the project cards, but it's clear that a FUZE-encased Pi is far better suited to education than the bare device alone. The chassis is solidly constructed, the software smart and the GPIO breakout provides much-needed protection against shorts.

Also consider

Gertboard
£31.20
Designed to vastly expand the capabilities of the Raspberry Pi's GPIO port, the Gertboard includes motor control, analogue-to-digital conversion, an embedded Arduino-compatible microcontroller and more. Its complex design means it's not ideal for younger students, however, and there are no enclosed cases suitable for a Gertboard-equipped Pi at present.
www.cpc.farnell.com

Arduino Experimenter's Starter Kit (ARDX)
£62
A well-established open source bundle, the ARDX includes an Arduino microcontroller which can be connected to any Linux, OS X or Windows-based computer – including the Raspberry Pi – to add hardware interface functionality, plus numerous components, a breadboard and a well-written booklet of projects to get users started.
www.oomlout.co.uk

More information

www.fuze.co.uk

MINI PC

CompuLab MintBox 2

£370 / $599

LinuxUser & Developer www.linuxuser.co.uk EDITORS' CHOICE

The MintBox 2 is here and it's more powerful than ever. Just how much power are you getting for nearly £400, though?

Pros
A super-powerful, tiny PC that is cheaper than equivalents from within the same company

Cons
Doesn't particularly benefit from the Linux Mint branding, and seems to run extremely hot even while idling

Last year's announcement of the original MintBox was a bit of a surprise. While Ubuntu has been distributed on some laptops and desktop PCs for a while now, Linux Mint doesn't quite have the mainstream penetration of the distro it's based on – and neither does it have a marketing team like Canonical's to try to promote it. The MintBox was a fairly high-end system, though, for its size, and served as a test platform to bundle Linux Mint with the Linux edition of any future fit-PC creation. One year on, a second MintBox has been released, imaginatively titled the MintBox 2, and is worlds better than the original.

The MintBox 2 is based on the incredible Intense PC, a product released earlier this year that we really liked in our review. Specifically, it's based on the mid-range of the Intense PC, running an i5 processor but with the RAM cut in half to 4GB. That still gives it plenty of raw power, though, while allowing it to idle at an astonishing 10W. The actual case itself still has all the hallmark Intense PC features – the exact same port layout is featured on the front and back, and the only noticeable difference is that the interchangeable front ports include Linux Mint branding instead of the Intense PC logo.

The sheer number of input and output ports on the rear and front allows you to do a lot with the box. Change the front four USBs for four Ethernet ports and you have a fantastic lightweight server and router for the home, and it will plug

CompuLab MintBox 2

Powerful miniature PC running Linux Mint

REVIEW

A wide range of ports around the back offer all manner of connectivity, from HTPCs to home servers

Technical specs

Operating system	Linux Mint
Processor	Intel i5-3337U
Memory	4GB DDR3
Heat dissipation	Die-cast heat sink case, fanless design
Networking	2x Gigabit Ethernet, 802.11 N Wi-Fi
Ports	6x USB 2.0, 2x USB 3.0, optical in and out, 2x eSATA, HDMI out, DisplayPort out

into just about any kind of display thanks to a HDMI port, Mini DisplayPort and a variety of connectors and adaptors included with the MintBox. This makes it an ideal candidate to use as a home media PC, due to its size and fanless design, and it could even be used as a Steam Machine in the future thanks to SteamOS.

Right now, it's powerful enough to easily play back high-bitrate 1080p media, and it can stream HD content from video services perfectly. While it won't properly compete against a purpose-built gaming machine, it's more than powerful enough to hold its own, especially for its size. It's also easily upgradeable, with a single compartment on the underside opening up to reveal the hard drive attached to it, and the RAM and other major components within easy access. The RAM is attached like laptop sticks, making it easy to pop out and increase to a maximum 16GB.

Linux Mint actually being in the box by default is something of a minor feature – it's definitely nice to have it there and the setup process is quick and painless, but it's very easily replaceable if you want to use the MintBox 2 for more than just a desktop PC. Linux Mint obviously runs extremely well on the system, and comes running MATE as standard rather than the more flagship Cinnamon; however, that's easily changed.

The one issue we did come across is that the MintBox 2 did get rather hot while idling. The Intense PC would get warm to the touch, but nowhere near these temperatures. The case itself is the heat sink, like the Intense PC, so it at least means it's doing its job, but we'd worry about putting it in an enclosed space. Having said that, with the correct level of ventilation or just out in the open, it is an incredible piece of kit, and a lot cheaper than the Intense PC equivalent.

Rob Zwetsloot

Summary

It can get a little toasty, but it's otherwise a fantastic piece of kit that is cheaper than its sister machines with almost the exact same specs. It's powerful, portable and has a huge range of suitable roles that it can easily pull off.

Also consider

Intense PC Pro

£630 ($999)

The MintBox's big sister, the Intense PC packs a lot more raw thanks to an i7 chip – however, you do pay a premium for using it. The case has the exact same fanless design and selection of ports, and is easily upgradeable as well.

www.fit-pc.com

Zotac ID41 Plus

£199.99

A lot cheaper than the MintBox, and a lot less powerful. It uses an Intel Atom chip, a bit less memory and is geared more towards being a media PC than anything else. It's still usable in many of the applications the MintBox 2 can manage, but not as well.

www.zotac.com

More information

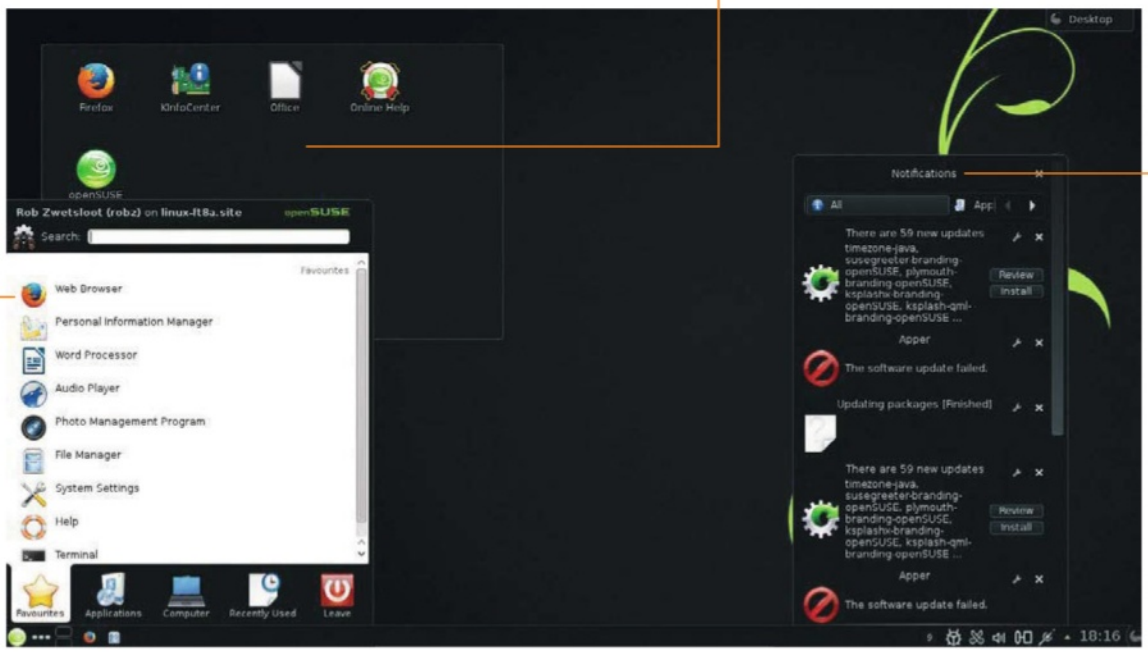
www.fit-pc.com

New features: YaST written in Ruby • Btrfs support • Nginx • KDE 4.11 • GNOME 3.10

■ App selection in openSUSE is very good, with a packed selection of default apps and a full repository

■ KDE and GNOME are still the standard desktop environments, and have been themed and tweaked by the developers

■ There are a selection of standard updates and bug fixes, but YaST is now completely written in Ruby



DISTRO

Best for: Office Desktop

openSUSE 13.1 RC 1

Minimum Specs: CPU 500MHz RAM 1GB STORAGE 3GB

A look at the release candidate for openSUSE's 13, the next step in the Linux distribution for everyone to use

Pros
YaST is now built in Ruby, allowing for easier development, and is still as easy to use as ever

Cons
No live booting off the full DVD, and a limited selection of official desktops compared to some distros

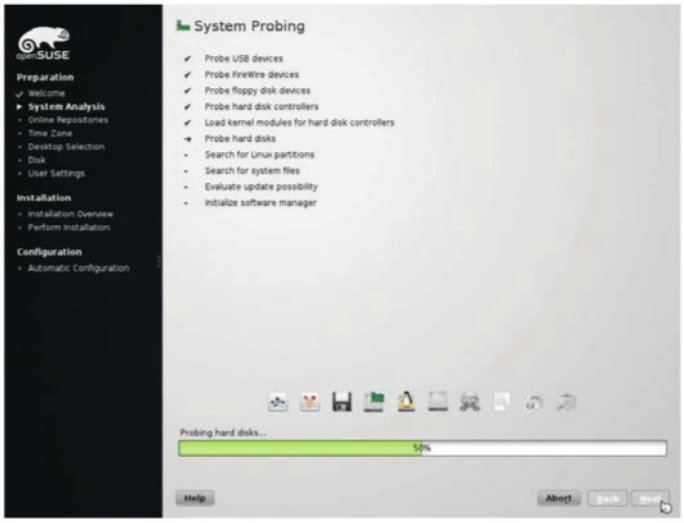
The 13.x line of openSUSE releases is just about here, ready to move beyond the troubled development woes that the community experienced last year for the early releases of 12.x. While there are only a few changes coming to the next version of openSUSE over the previous ones, there are some wide-reaching effects to various levels of users.

One of the most important changes implemented in 13.1 is porting YaST to Ruby. Previously, the openSUSE control centre software was built in its own proprietary language, meaning few people in the community were able to easily contribute to its code. The port to Ruby has been a straight job, and it was introduced as part of the distro during a beta version of 13.1. For the desktop user, this may not mean much, but to the developers and the community it's a huge step forward in allowing one of the major features of openSUSE to be much more open and friendly to those who want to commit changes.

With the first iteration of such a port let loose in the wild, it's natural to be concerned over the new YaST's stability and quality – thankfully, the porters seem to have done an exceedingly good job. The control centre is as usable as it's ever been, and there were no issues using it for adding and removing software, changing network settings, adjusting the boot menu and all the other tasks it can perform.

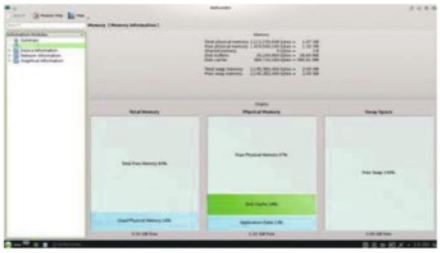
Minor updates

As well as YaST, there's been some great improvements over Btrfs, the future file system that keeps being just out of reach. It's not a default yet, but the developers and community have



Installation from the full DVD allows for a complete and customisable install, while the live CDs offer a great preview

The YaST control centre allows you to access and modify just about every important aspect of the system for both users and sysadmins



System information is easily accessible, allowing for diagnostics of the system on every level

“For the developers and the community it’s a huge step forward”

been making an effort to improve its support in the latest version of openSUSE with some impressive results. Right now it’s considered safe to use, with the intention that it’ll be a default in 13.1. We’ve heard that line before, though, about Btrfs from other developers.

There’s a host of updates to all the desktop environments, the Linux kernel has been updated to version 3.11.3 (with the added Btrfs patches) and interestingly, there’s an effort to update GStreamer from 0.1.0 to the newer 1.0 – although this hasn’t been implemented as of the release candidate.

Aside from the big changes to YaST, it’s somewhat of a safe update for openSUSE. There’s no problem with this, of course, though, and it’s allowed it to stay rock solid and compatible with a lot of hardware types and keep its great user experience intact.

Rousing performance

Updates and new features aside, openSUSE 13.1 still works as advertised. The images supplied come in three main flavours – two live discs containing one of the two main desktop environments, and the full installation DVD. The KDE and GNOME spins allow you to live-boot into openSUSE and give it a test before committing to installing, while the DVD version is specifically just for installation.

The DVD installer is still one of the better Linux installers out there. The dedicated process is split up into distinct sections with a logical flow to the process. Default options are passable for the lower-end users, while there’s plenty of room for customisation and further setup for the more advanced users that encompass the targeted user base of openSUSE itself. You can also choose between the main supported desktops, or select a more lightweight alternative if you require it. The only thing really missing is adding or removing different software packs, the kind that the Mageia installer provides. While you can make your own custom ISO that will do this for you with SUSE Studio, it would be nice to have even a basic version of it with the official release.

Installation is quite fast, and will automatically restart and dump you into the desktop. The openSUSE desktop themes continue to be some of the best around, with great aesthetics and design ethos that eke a little bit more out of the standard KDE and GNOME.

The next generation

Right now, then, everything looks fantastic for the next openSUSE. The philosophy of the distro has always been about making it the best OS to use for novices and veterans alike. This is again accomplished with a fantastic selection of tools for sysadmins to manage the systems locally or remotely, and a smart design that allows normal desktop users to quickly get into a new workflow rhythm. OpenSUSE is also about community, and the changes to YaST and efforts made with Btrfs are a great indicator of how strong it currently is. We look forward to seeing what the next version brings.

Rob Zwetsloot

Screenshot Gallery

bit.ly/oS131LUD

Summary

The community distro returns with a new version of YaST and a series of updates that still allow it to be one of the most usable and stable distros available. The 13.x line of openSUSE may be the best yet.

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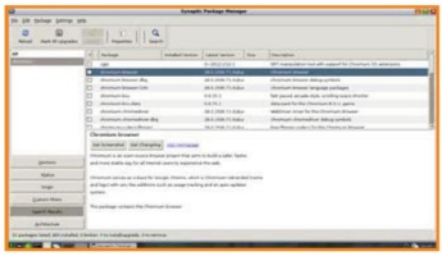
The new MATE spin is a nice addition to the WattOS family

WattOS can now be even more lightweight thanks to Microwatt



The Ubuntu repos help flesh out the distro

DISTRO

WattOS R7.5

The lightweight and green distro now comes in more flavours to suit your needs, but do they still keep up with the WattOS ideal?

WattOS is a somewhat unique project in a landscape full of low-resource distros to either maximise CPU cycles or keep old systems running. It has always managed to stand out from the crowd though by offering a user experience that is barely any different from full-fat Linux distros, thanks to smart design decisions, and this tradition has been extended slightly further with the latest release.

While there's still the standard WattOS running LXDE, there are now also two alternatives. Along with the much lighter Microwatt spin that uses pekwm, there's also a brand new MATE spin that is a little more functional than the standard version, although this comes at the price of using up a few more resources. All versions are based on Ubuntu 13.04, and while this does mean WattOS has access to the great Ubuntu repositories, some packages will be a little out of date.

All the main spins run extremely fast, with very little difference in performance between the MATE and Microwatt spin on a modern system. The workflow and UX on the Microwatt and standard release are very similar, with the modified pekwm proving to be a fantastic desktop environment to work in, definitely on a par with other ultra-light solutions such as pure Openbox or Razor-qt. The default application selection is kept very limited to cut down on bloat, with Midori replacing Chromium as the web browser of choice in Microwatt. While there are no office suites installed, printer management, multi-users and more are already set up from the start.

You can easily extend the functionality thanks to the aforementioned Ubuntu sources, and you also have access to Ubuntu PPAs and other third-party repos to help build upon the WattOS base. It's the best of both worlds that a lot of lightweight distros strive for, and WattOS manages to achieve.

Aside from an older package base, the only other small issue we'd take with WattOS is that the images for each version of the distro are quite large for a lightweight release. The live environment does not offer any extra applications or packages either, and the MATE version comes in at a full CD size of 700MB. It's a minor issue, but it limits its uses as an emergency live distro.

Rob Zwetsloot

Summary

WattOS's extra flavours have not made it change all that much, with the core philosophy of the distro still very much intact. The extra variety afforded by the new versions helps users make a better decision on how exactly they want their WattOS served to them as well.

Pros

Varying degrees of power consumption from ultra-lightweight to lightweight while still being usable at each stage

Cons

ISOs are quite large for a distro of its type, and it's based on the previous version of Ubuntu

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Pro Android C++ with The NDK

Author	Onur Cinar
Publisher	APress
ISBN	978-1430248279
Price	£29.50
Score	4.5

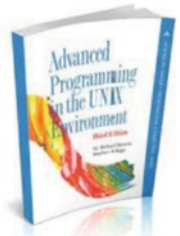
If your app depends on getting the last ounce of performance squeezed out of an Android device's hardware, native code is the way to go. Cinar pads the book out a little with too much 'getting started' material, but includes some useful threading examples, troubleshooting advice and a good JNI introduction.

Lift Cookbook

Author	Richard Dallaway
Publisher	O'Reilly
ISBN	978-1449362683
Price	£18.99
Score	4.5

A set of recipes for using the Scala-based web framework. Not necessarily a beginners' book, but manageable for those familiar with Scala, or ready to tackle the alternative to MVC that seems a natural fit for a language offering an alternative to all things OO.

Advanced Programming in the UNIX Environment (Third Edition)

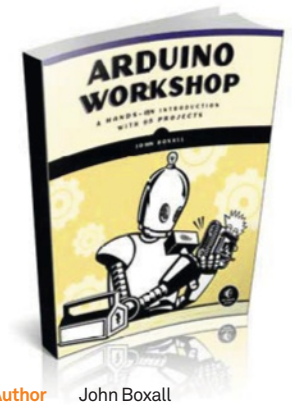


Authors	W Richard Stevens & Stephen A Rago
Publisher	Addison Wesley
ISBN	978-0321637734
Price	£28.99
Score	5

Two decades after the first edition, and a more timely eight years after the second, Stevens and Rago's classic reference work for anyone programming in C for the *NIX platform has been updated and expanded for modern OSs, interfaces and multi-core processors.

Arduino Workshop: A Hands-On Introduction With 65 Projects

Learn hardware, coding & electronics together



Author	John Boxall
Publisher	No Starch
ISBN	978-1593274481
Price	£20.49
Score	5

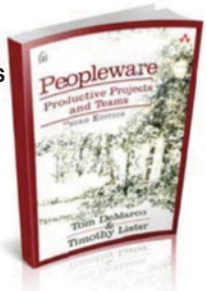
For eight years now, Arduino has been the gateway to hardware hacking, learning programming, electronics and the Internet of Things, to countless thousands.

After a useful getting started section, Boxall launches into 65 projects; very much learning by doing. Projects are grouped in themed chapters, such as 'Motors and Movement'; 'Infrared Remote Control'; and 'Cellular Communications'. The last of these includes projects that get your Arduino to call or send a text message when an event occurs – such as an alarm being tripped, or the freezer temperature rising above a certain level – and to send text messages to your Arduino to operate remote controls.

Although the projects are packed in, Boxall manages to explain what each will accomplish, then walks you through the code in a way that should encourage novice programmers to learn as they go along. A good book both for the enthusiastic beginner and for all Arduino owners looking to explore more possibilities in these flexible devices, including the many add-on 'shields'.

Peopleware: Productive Projects and Teams (Third Edition)

Treating software teams like collections of human beings



Authors	Tom DeMarco & Timothy Lister
Publisher	Addison-Wesley
ISBN	978-0321934116
Price	£25.99
Score	5

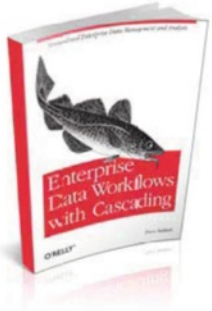
Teams of software developers need protecting from management's best efforts to destroy them. 26 years after it first appeared, Peopleware's simple message – the problems of systems work are sociological: people are not modular units, and their idiosyncrasies cannot be ignored – continues to be ignored. Well, not quite everywhere, as the book has great examples of good management in many companies.

From the madness of cramming creative folks into tiny desks in windowless open plan offices, to making a community, DeMarco and Lister show how management can protect teams from corporate pathologies and enable them to thrive.

The last section deals with the idea that work should be fun. The authors' dry humour infuses every example, making these important lessons a pleasurable read, and a valuable reread.

Enterprise Data Workflows with Cascading

Abstracting Big Data workflows with Hadoop through JVM languages



Author	Paco Nathan
Publisher	O'Reilly
ISBN	978-1449358723
Price	£26.99
Score	4.5

A short but useful look at Hadoop's abstraction framework, Cascading. Nathan dives straight into 'Hello World' type examples and builds on them, before looking at theory. From TDD to Literate programming, the emphasis is on best practice throughout. Particularly welcome are the chapters on Cascading's DSLs for other JVM languages: Scalding on Scala and Cascalog on Clojure. These, unlike Java, allow code to be written at a level close to Cascading's conceptual idea of plumbing pipes as workflow. Scalding is deployed on Cascading at Twitter, eBay, LinkedIn, and Etsy; Cascalog uses Prolog-subset Datalog, which will involve further reading. Case studies include examples of openly available large data sets, rounding off a thoughtful introduction which everyone facing workflow challenges with Big Data will want to consider.

Questions & answers

Contact us...

Web: www.linuxuser.co.uk
Email: linuxuser@imagine-publishing.co.uk

Facebook: Linux User & Developer

Twitter: @linuxusermag

Your questions answered

Send us your questions and we'll do our best to answer them!

FAQ: Using virtual machines with VirtualBox

Q: How do you best set up a virtual machine in VirtualBox?

*A: Click **New** on the main interface to bring up the window to begin setting up your VM. Give it whichever name you wish, and select Linux as the type. The RAM bar will be set at a recommended amount, but you can increase this as much as you're comfortable with – there's a handy guide to let you know how much is too much RAM below the selector. Use all the defaults for creating a hard drive, and give it more space if you need to.*

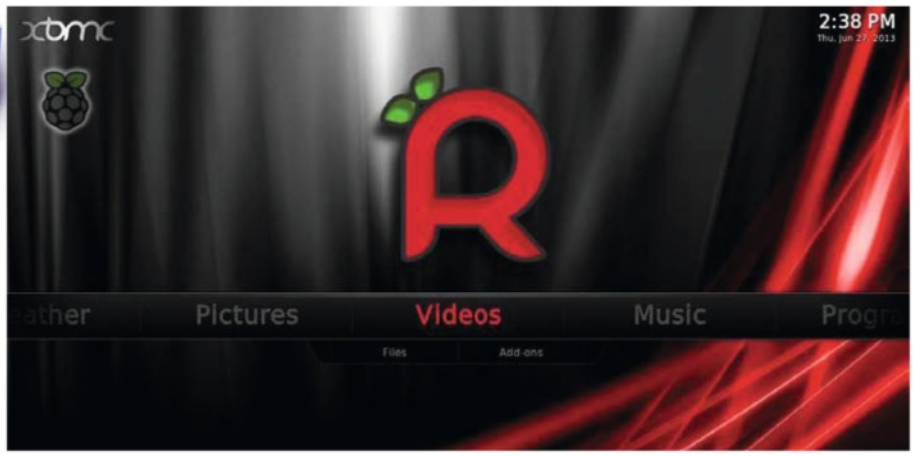
*Once that has created the VM, click **Settings**. Click on **Display**, enable 3D acceleration and increase video memory to 128MB, especially if you plan to use a distro with a desktop environment. Go to **Storage**, attach your distro image, then click **Start**.*

Q: Should I use a 32-bit or 64-bit ISO?

A: 32-bit images will generally run better, even on a 64-bit host system. However, if you need to test a 64-bit application or something similar, you'll need to install that.

Q: Can I dual-boot on a virtual machine?

A: Yes you can. You'll need to either make space on the virtual hard drive, or attach another in the VM's settings. You won't need to do anything special to get GRUB to dual-boot either, as it will install to one of the virtual hard drives like it would a normal hard drive – much like it would in a standard virtual install.



■ Raspberry Pi media centres are a great use for the board

Hissberry Pi

Hello, I'm using a Raspberry Pi Model B, with the latest Raspbian installed. I tried to connect it to a TV using an RCA cable in the video out, and an audio jack to an amplifier with speakers.

The problem is that I get a pretty loud noise on the speakers, although it depends on what is being shown. If the screen is full white, the noise is loudest.

I tried it with another television and its internal speakers and the same problem occurs. Is there a way to fix this problem?

I tried using a USB sound card, but that is not the solution for me because my application uses a few streams of aplay that are sometimes run at once and that case causes aplay to freeze while using external sound cards, it seems.

Roy Allen

There are a few things we can recommend to try to sort out the hissing problem, as it could be a number of issues.

First of all, make sure everything is connected. When you hear the noise, unplug the video cable. If the noise goes away, and the audio returns to normal, replug the video cable and unplug the audio one. If the video quality changes, then you'll need a new cable most likely. Otherwise, if the audio changes, then you'll want a new cable there.

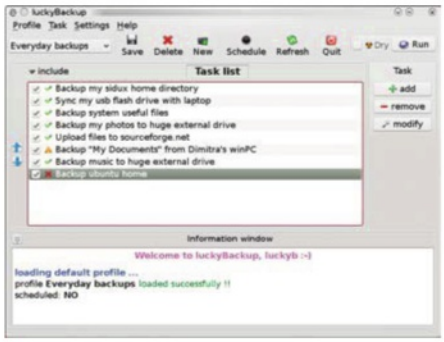
You could also try getting a ground loop isolator – it's a type of audio transformer that separates the TV ground from the audio ground. The problem might just be weird electrical fluctuations somewhere in the system, and this will help to reduce or stop that.

Happy viewing.

Symbolic deactivation

I use luckyBackup (an rsync-based backup package) to back up my data to a dedicated 500GB hard drive.

My source data contain several symbolic links. My problem is that the symbolic links that have been copied to the backup drive remain active. So, if



■ LuckyBackup is a great tool if you use it right

I make a change to a linked directory on the source drive, the change shows up immediately on the backup (target) drive. This is undesirable behaviour.

I'm wondering if there is a way to deactivate all symbolic links in a directory, or even an entire partition?

I found something about a 'disable_symlinks' option, but that appears to be only for an Nginx system. Thanks.

John Digby

The best advice we can give is to keep the symlinks unmodified – unfortunately they need to be this way to ensure the backup is an exact copy of the original data.

It sounds like what you're doing is following the symlinks from the backup directory rather than having them change in unexpected ways– make sure you're not doing that, as they will be treated differently.

As well as symlinks, look out for FIFO files, sockets and device files. These can also do something you didn't expect. We hope that this all helps to keep your backups in order, John.

Chrome effect

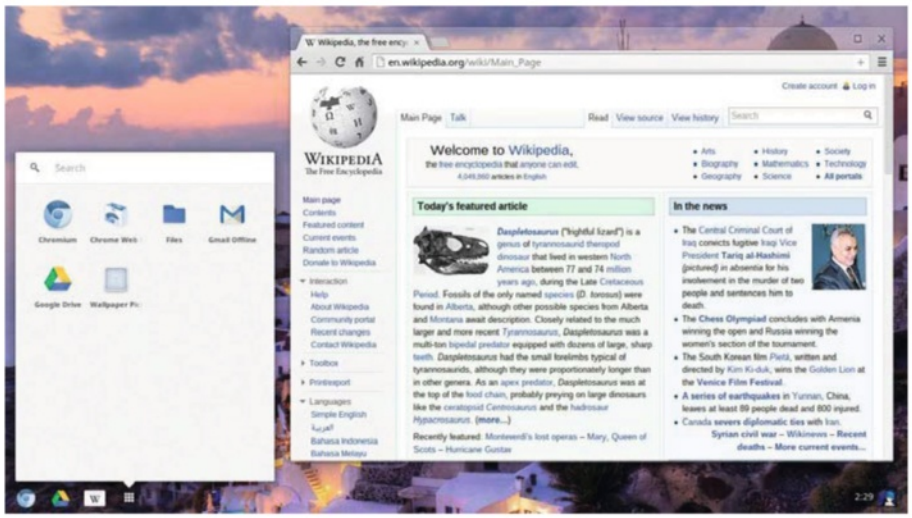
I've always been very interested in Google's Chrome OS. I'm very much in the Google ecosystem, so the online services and Drive storage are perfect for the way I work – I regularly have access to Wi-Fi, so there's never any problem on that end.

The problem is, I do like having my choices and being able to boot into a standard OS on my laptop, and I don't want to be carrying around another, expensive device with me. Is there anyway I can get Chrome OS and use it on a normal laptop?

Will Burton

You certainly can. Chrome OS, like the Chrome web browser, has an open source equivalent known as Chromium OS. The necessary files to build this are readily available as part of the Chromium project, and all you need to do is download and build it for your specific laptop's architecture. You can even install it to a USB stick, allowing you to only use it when you want to.

Otherwise, it's a little older now, but there was a project that released images of Chrome OS to the public by a hacker called Hexxeh. It hasn't been updated for a few months, but you can always test-drive



■ Chrome OS and Chromium OS are an interesting take on a desktop OS

Good puppy

■ Puppy is an excellent distro for older or slower systems

I've really fallen in love with Puppy Linux. It's a great little lightweight OS that fits the needs of my PC perfectly. It's getting on in years – it's one of the first systems that actually came with Windows XP in the early Noughties – so I've decided to dual-boot a frugal Puppy install with my current XP install so I can get the best of both worlds.

Unfortunately, something seems to have gone wrong. I can boot into XP just fine. However, whenever I try to boot into Puppy Linux, I just get stuck on the pound sign.

Do you guys have any idea what I should do? I don't want to lose my files, and I'd rather reinstall only as a last resort if that would be the case.

Patrick Nicholson

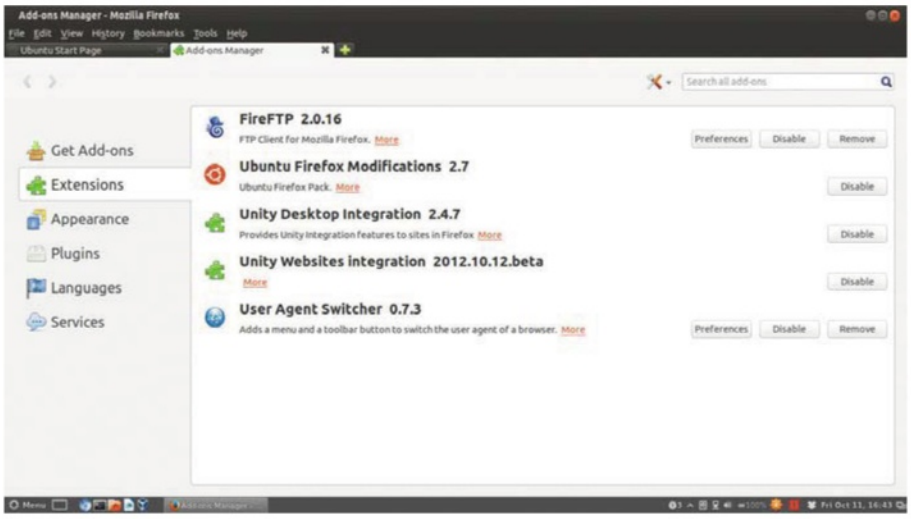
Well we should be able to save your files either way, so don't worry too much. We're assuming as it's a standard Puppy install that you don't use NTFS storage for your files on there, which is understandable, but also means your working XP install won't be able to see it. Well, in trying to fix it, we can at least recover the files.

Get a live CD (or live USB if it will work) of the version of Puppy you use ready. Live-boot into it, mount the hard drive you were using for storage, and copy any files off just in case. Now, delete the personal save file you'll have in ***/mnt/home*** *of the mounted Puppy installation and reboot. If that doesn't work, then you'll at least have your files safe so you can reinstall.*

Questions & answers

Facebook: Linux User & Developer

Twitter: @linuxusermag



■ Firefox extension bloat is one of the reasons why Chrome and Chromium took off in the first place

Chrome OS on your laptop before spending the time building it. The images can be found on ***chromeos.hexxeh.net****.*

Overarching problem

I've installed Arch on two machines in quick succession very recently, and for some reason Firefox is amazingly slow on both. It happened on my main install too, so I decided to check out Chromium, and that works just fine. I'm usually a big fan of Arch, but this is not happening on any of the other systems I've had to look at recently with other distros.

This happened one or two days ago, all installs are fresh with no AUR software. I noticed the problem and thought it was caused by my overclock, but as the other systems aren't overclocked I'm guessing that is not the case.

I also thought 'lib32-flashplugin' would solve it, but still nothing.

Have you encountered this problem? The program freezes after a few minutes.

George White

Hi George, don't lose faith in Arch just yet! It sounds like it may be more of a Firefox problem if Chromium is working fine. We assume you're using a similar setup across the systems for Firefox, which is causing the issue. It may very likely be a plug-in taking up too many resources; it unfortunately happens in Firefox a bit too often. Either disable them one by one and see if you can isolate it, or reset the entire browser by going to ***Troubleshooting Information*** *and then clicking* ***Reset Firefox****. This will return Firefox to a blank slate, no cookies, no extensions etc.*

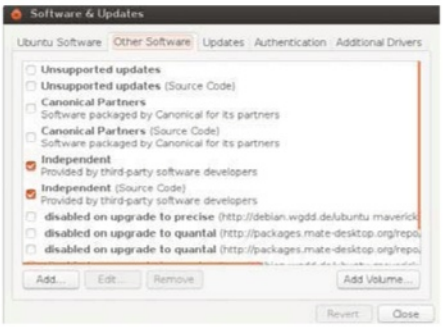
If that's still not helping, then you might have to wait for an update to Firefox. Chromium is still pretty great, though, so it shouldn't be too tough a wait.

PPA removal

At the beginning of the year I added a PPA in Ubuntu so I could get some specific packages installed to my system. Nothing too major, though. Unfortunately, the PPA seems to be abandoned and while I've found an alternative, I like to make sure my repository list is nice and clean. I'm not quite sure how to remove it, though, as I've never had to get rid of a PPA. How do you go about doing it?

Thanks.

Blair Oakley



■ The software sources list in Ubuntu can be a little limited

This isn't quite so straightforward as removing normal repositories. While you can easily disable PPAs, there are only very few specific methods to actively remove them from your sources list.

First of all, as previously mentioned, you can disable them. To do this, open the Ubuntu Software Centre. Click ***Edit*** *on the top bar and select* ***Software Sources****. This will open the window with all your repositories listed, and you can uncheck each one to disable them. Normal software repositories can also be deleted here, but not PPAs.*

To remove the PPA completely, close the Software Centre and open up the terminal. You need to use the ***add-apt-repository*** *command with a* ***-remove*** *tag to get rid of the PPA. Something like:*

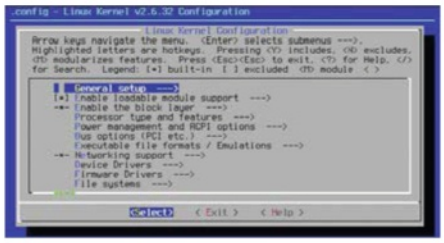
```
$ sudo add-apt-repository remove
ppa:repo/ppa
```

That should get rid of it. Perform a `sudo apt-get update` *and that will stop Ubuntu from doing anything silly when you next try to install some software.*

Install or not install

When I run the configure script for a program I'm trying to build, I get an error saying

> **"It may very likely be a plug-in taking up too many resources; it unfortunately happens in Firefox a bit too often"**



■ The standard kernel config is written in ncurses

'PACKAGE requires ncurses', but when I use YUM to install ncurses it says it is already installed. Here's the error code it spits out:

checking for wresize in -lncurses... no
configure: error: PACKAGE requires ncurses

~# yum install ncurses
Loaded plugins: langpacks, presto, refresh-packagekit
Setting up Install Process
Package ncurses-5.8-2.20110319.fc15.x86_64 already installed and latest version
Nothing to do

I tried using YUM to reinstall the ncurses package, but that didn't fix the issue. I have ncurses-5.8-2.20110319.fc15.x86_64 already installed.

Do you know what might be the issue?

Dan Walsh

Well, for this kind of thing, you will need a little more than ncurses installed to get it to work. You will also need the devel package, so make sure that it is installed by using:

```
$ yum install ncurses-devel
```

A lot of development issues when trying to build stuff involve devel dependencies if the standard package is not enough. Make sure your ncurses-devel matches the version of ncurses you have installed, though.

Clammed up

I'm using Debian Wheezy 7.1 on my main system and I'm trying to get ClamAV anti-virus to work on it, but for some reason it just won't run! I tried to install it using `aptitude install clamav` and when I try to run `freshclam`, the output warns of it not being up to date and it refuses to do anything more. Is really necessary update my version of ClamAV? The Debian repository doesn't have this final version as far as I can tell, so what can I do to solve this problem?

Al Blackley

While Clam AntiVirus is in the standard Debian repos, they are not always the most recent versions, which is why a second repository with newer packages is available in the Debian volatile project. This has been merged in some way with the standard Debian repos, but it's not immediately available, so you'll need to add a new repo to your sources list like so:

```
deb http://ftp.[XX].debian.org/
debian squeeze-updates main contrib
non-free
```

...where XX is your two-letter country code.

■ Clam's main use is as a mail scanner

Grey days

Today my Thunderbird calendar got completely greyed out. I can't set tasks, change the view (from day to multi-week) or in general push any button. I did run an update today that installed new ºkernel updates, although that hasn't caused me any problems in the past and a cursory search suggests it's not that. I am running Xubuntu, and the calendar extension Lightning is supposed to be compatible with the latest version of Thunderbird.

I can't see anything in the configuration that I could use to remedy this situation, so I'm not really sure what to do about it.

Guy King

We can tell you that it's definitely not the kernel update that caused this issue – the issue is more likely with updating Thunderbird and/or your extension. Lightning itself can be notorious for having wild compatibility issues between point upgrades of the extension itself, so either try reverting it to an earlier version, or try reverting Thunderbird if you can.

Firmer ware

I've finally got around to using my Raspberry Pi – I've had it sitting in a cupboard for a little while due to house moving and such, and I never really had a chance to make use of it. I've got a few projects in mind for it; however, I'm aware that the Pi itself might need some newer firmware as I did get it closish to the launch.

How do I update the firmware on my Raspberry Pi, then? Do I need to use any special tools for it, or is it relatively straightforward?

Hope you can help.

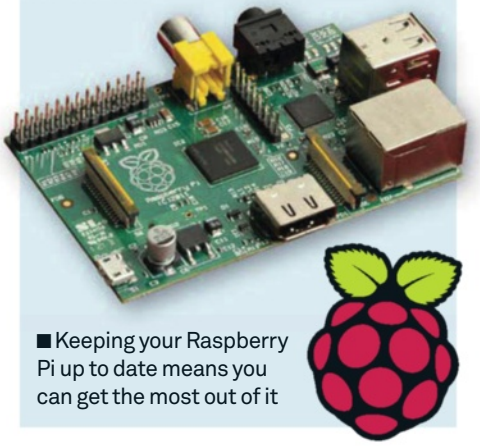
Ethan Dawn

While it used to be a little tricky at the time you bought your Raspberry Pi, things have been made a bit easier since then. Someone put together a simple package called rpi-update that updates firmware and other Raspberry Pi stuff, and has been made specifically for Raspbian. It's now actually included with the distro, so we suggest you make an SD card with Raspbian and plug it into your Raspberry Pi.

At the initial setup screen, there's an option to update before continuing, so make sure you do that. Otherwise, if you already have Raspbian set up, you can simply open a terminal and use:

```
$ rpi-update
```

Make sure you've updated Raspbian's software each time you do it, though. You don't need to use Raspbian for the firmware updates to stay in effect.



■ Keeping your Raspberry Pi up to date means you can get the most out of it

Hosting listings

Dedicated server listings

Got a deal you think we should list?
Whether you're a hosting firm or a happy customer who wants a favourite provider listed, drop us a line with the details!
linuxuser@imagine-publishing.co.uk

NAME AND URL	PACKAGE	PHONE NUMBER	COST PER MONTH	MINIMUM CONTRACT TERM	CPU CORES / SPEED	DISK SPACE	1GBPS INTERNET CONNECTION	HARDWARE RAID	REMOTE POWER REBOOT	PERMANENT KVM	UPTIME GUARANTEE	NETWORK BACKUP STORAGE	PRIVATE SUBNET	24/7 PHONE SUPPORT
Netcetera www.netcetera.co.uk/linux	2200DC	0800 061 2801	£50	1 month	Dual Core 2.2GHz	160GB	N/A	Raid 1	✓	✓	✓	✓	✓	✓
	3000DC	0800 061 2801	£80	1 month	Dual Core 3GHz	2 x 250GB	N/A	Raid 1	✓	✓	✓	✓	✓	✓
	2660QC	0800 061 2801	£130	1 month	Intel Quad Core 2.66GHz	2 x 500GB	N/A	Raid 1	✓	✓	✓	✓	✓	✓
	Developer	0800 061 2801	£32.89	1 month	N/A	1GB	N/A	✓	✓	✓	✓	✓	✓	✓
	One	0800 061 2801	£109.99	1 month	N/A	5GB	N/A	✓	✓	✓	✓	✓	✓	✓
	Reseller	0800 061 2801	£274.89	1 month	N/A	Unlimited	N/A	✓	✓	✓	✓	✓	✓	✓
Bravo14 (http://bravo14.co.uk)	Starter Linux	N/A	£20	N/A	N/A	2,000MB	N/A	✓	✓	✓	✓	✗	✓	✓
Bravo14 (http://bravo14.co.uk)	Starter Windows	N/A	£20	N/A	N/A	2,000MB	N/A	✓	✓	✓	✓	✗	✓	✓
Bravo14 (http://bravo14.co.uk)	Business Linux	N/A	£45	N/A	N/A	4,000MB	N/A	✓	✓	✓	✓	✗	✓	✓
Bravo14 (http://bravo14.co.uk)	Business Windows	N/A	£45	N/A	N/A	4,000MB	N/A	✓	✓	✓	✓	✗	✓	✓
Bravo14 (http://bravo14.co.uk)	Ultimate Linux	N/A	£60	N/A	N/A	Unlimited	N/A	✓	✓	✓	✓	✗	✓	✓
Bravo14 (http://bravo14.co.uk)	Ultimate Windows	N/A	£60	N/A	N/A	Unlimited	N/A	✓	✓	✓	✓	✗	✓	✓
PoundHost www.poundhost.com	FlexServer2	01628 777730	From £29	12 months	Dual/Quad Core	160GB to 2TB	10Mbps	✗	✓	✓	99.90%	10 GB	✗	✓
	BudgetBox III	01628 777730	£36	1 month	Intel Xeon 3065	1 x 250GB	100 Mbps	✗	✓	✓	99.90%	10 GB	✗	✓
	SSD 4	01628 777730	£60	1 month	Quad Core Intel Xeon X3430	120GB Intel 520 SSD	100 Mbps	✗	✓	✓	99.90%	10 GB	✗	✓
	Merlin	01628 777730	£199	1 month	2 x Intel Xeon Quad Core	2 x 500GB SATA II	100 Mbps	✓	✓	✓	99.90%	10 GB	✗	✓
	DS6.5	01628 777730	£295	1 month	2 x Intel Xeon Hex Core	4 x 1TB SATA III	100 Mbps	✓	✓	✓	99.90%	10 GB	✗	✓
	Cloud Server	01628 777730	£52	1 month	2 vCPU (4GB)	40GB	Gbit shared / node	✓	✓	n/a	99.90%	0	✗	✓
	Cloud Server	01628 777730	£98	1 month	4 vCPU (8GB)	40GB	Gbit shared / node	✓	✓	n/a	99.90%	0	✗	✓
Heart Internet (www.heartinternet.co.uk/dedicated-servers)	Linux Dual Core	0845 644 7750	£79.99	12 months	Dual Core Xeon 2.33GHz	160GB	✓	✓	✓	✗	99.99%	✓	✗	24/7 Ticket support
Heart Internet (www.heartinternet.co.uk/dedicated-servers)	Windows Dual Core	0845 644 7750	£89.99	12 months	Dual Core Xeon 2.33GHz	160GB	✓	✓	✓	✗	99.99%	✓	✗	24/7 Ticket support
Heart Internet (www.heartinternet.co.uk/dedicated-servers)	Linux Quad Core	0845 644 7750	£129.99	12 months	Quad Core Xeon 2.5GHz	250GB	✓	✓	✓	✗	99.99%	✓	✗	24/7 Ticket support
Webfusion (www.webfusion.co.uk)	Dell PowerEdge R210	0845 130 1602	£79.99	12 months	2x 3.06GHz	250GB	Up to 100Mbit	✗	✓	✗	99.99%	Free	0	✓
Webfusion (www.webfusion.co.uk)	Dell PowerEdge R210	0845 130 1602	£119.99	12 months	4x 2.66GHz	2x 250GB	Up to 100Mbit	✓	✓	✗	99.99%	Free	0	✓
Webfusion (www.webfusion.co.uk)	Dell PowerEdge R210	0845 130 1602	£149.99	12 months	4x 2.66GHz	2x 500GB	Up to 100Mbit	✓	✓	✗	99.99%	Free	0	✓

0 = Option

Dedicated and Shared server listings

	PACKAGE	PHONE NUMBER	COST	WEB SPACE	MONTHLY BANDWIDTH	POP3 ACCOUNTS	DATABASE SUPPORT	SHOPPING CART	VIRUS FILTER	FIREWALL	PHONE SUPPORT	EMAIL SUPPORT	WEB CONTROL PANEL	SERVICE LEVEL AGREEMENT
1&1 Internet Ltd www.1and1.co.uk	1&1 Starter (Linux)	0844 335 1211	£29.88	5GB	Unlimited	1,000	✓	✓	✓	✓	✓	✓	✓	✗
	1&1 Standard (Linux)	0844 335 1211	£59.88	50GB	Unlimited	3,000	✓	✓	✓	✓	✓	✓	✓	✗
	1&1 Standard (Win.)	0844 335 1211	£59.88	50GB	Unlimited	3,000	✓	✗	✓	✓	✓	✓	✓	✗
	1&1 Unlimited (Linux)	0844 335 1211	£83.88	Unlimited	Unlimited	5,000	✓	✓	✓	✓	✓	✓	✓	✗
	1&1 Unlimited (Win.)	0844 335 1211	£83.88	Unlimited	Unlimited	5,000	✓	✗	✓	✓	✓	✓	✓	✗
	1&1 Business (Linux)	0844 335 1211	£119.88	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✗
	1&1 Business (Win.)	0844 335 1211	£119.88	Unlimited	Unlimited	Unlimited	✓	✗	✓	✓	✓	✓	✓	✗
eHosting (www.ehosting.com)	Starter	0844 999 4100	£23.88	1GB	25GB	10	✗	✗	✗	✗	✗	✓	✓	✓
eHosting (www.ehosting.com)	Personal	0844 999 4100	£59.88	2.5GB	Unlimited	50	✓	✗	✗	✗	✗	✓	✓	✓
eHosting (www.ehosting.com)	Expert	0844 999 4100	£95.88	5GB	Unlimited	250	✓	✗	✗	✗	✗	✓	✓	✓
eHosting (www.ehosting.com)	Virtual	0844 999 4100	£227.88	50GB	Unlimited	Unlimited	✓	✗	✗	✗	✓	✓	✓	✓
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YOUR VIEW

Linux User Letters

Your opinions about the magazine, Linux and open source

Touch of Ubuntu

So what happens now that the Ubuntu Edge didn't hit its target? It's been a while since they tried to get it off the ground with Indiegogo, and we haven't heard a peep from them about any future hardware ideas. That can't be it for a pure Ubuntu phone, surely? I'm going to try out Ubuntu Touch once it hits Samsung Galaxy phones, but I was intrigued to see what Canonical were going to do after the campaign ended, as they seemed to drum up a lot of positive press over it.

Tom Abel

We've done a full report on the current state of Ubuntu Touch earlier on the magazine, and hopefully that will help you figure out if the actual OS is something you'll be interested in. As for actual Ubuntu hardware, there's no concrete information on whether or not the Edge will go ahead via any other means. Canonical has always been very vague about its so-called hardware or silicon partners, and some people believe the crowdfunding campaign was merely to try to get publicity for the mobile OS, rather than an actual phone in people's hands.

Even if the campaign failed to hit its target, it got a lot of interest

Preach to the converted

I'm sometimes asked by my friends and family members what's a good way to get into Linux – I've been using one distro or another since college, and I've managed to convince a few people that have asked me to make the switch from whatever they're using. However, I'm very aware of how intimidating it can be to jump right in at the deep end. I usually recommend Ubuntu; however, I'm finding people generally dislike the interface, and it's a bit tricky for them to install a new one as Linux newbies. It's difficult to recommend specific distros to people that I don't use any more, and I doubt they'll want to start with Gentoo.

Ian McGarrigan

The simplest thing we can say is why not recommend Kubuntu instead of Ubuntu? If they're coming from Windows, it does have a similar style to that layout, while still looking aesthetically quite modern. There are other distros as well, like Linux Mint, Zorin and Elementary, all of which are very focused on the quality of the interface. That way the user doesn't have to open the terminal to get things done, which would be intimidating to a lot of people.

Make mine MakerBot

I'm very interested in the current 3D printing trend. However, the only one that people seem to talk about are the MakerBot products. Sure, they sound good, and they have some degree of openness, but I hear the recent Replicator 2 is a lot more closed than previous iterations of the products they make.

With the move to more open hardware, and there initial success probably being in part due to its openness, it seems like they're turning

Zorin is based on Windows, allowing some people to transition to Linux more easily

their back on the open source community. However, due to the coverage of MakerBot products, it seems like any fledgling open 3D printers don't get any chance to shine.

James

Some of the software for the MakerBot hardware is still open. However, since the Replicator 2, MakerBot has closed off the hardware for the device. The firm's reasoning seems a little flimsy – its previous kits have been hobby builds made out of wood, whereas the Replicator 2 is a proper prosumer box that small companies can use as well. It seems MakerBot hasn't stopped altogether with open hardware, just that it will have a more professional line for businesses not interested in that side of it.

As for open hardware, MakerBot's earlier models are based off the RepRap, an open hardware standard for 3D printers that allows you to 3D print parts of itself for repairs or to make another.

The last open MakerBot printer, but hopefully not the last

Opened Valve

I'm a little worried about the 'openness' of SteamOS and the Steam Machines. As Richard Stallman pointed out a little while ago, Steam itself is inherently closed, and so are the games released for the system. It also relies on some heavy DRM. All of this seems very anti-Linux, and anti-FOSS in general. My main concern is that people will then believe Linux is like this SteamOS, and while more people might be using Linux as a result, they won't understand the core tenets of free software.

Josh Wood

Right now we really don't know how open the distro or hardware will be – Valve claims it's open, and it's not the kind of company to throw that around without good reason. While the DRM issue will probably still persist to SteamOS, there are actually a few open source games released on Steam. These titles just download the source code along with the game for users to access; however, on SteamOS this will likely not be so practical. One of the bigger issues right now is that you'll most likely need a Windows box for a while to play all the games offered via the Steam service, which has its own anti-FOSS implications.

How open will SteamOS end up being?

Steamed up

The SteamOS announcement sounds incredible! I'm basically now planning to set up my own little box hooked up to my TV to stream all my PC games to it. The one thing I'm concerned about, though, is how open it will actually be. Can I install XBMC to it, or another desktop environment? I'm not sure I'd be able to properly dual-boot between it and a media centre solution, and I doubt the video apps will be enough to replace this. Here's hoping it's as open as Valve claims!

Mike Simpson

A heavily customisable SteamOS could be the ultimate home media solution

That's definitely a question we have about SteamOS. It could easily become all you need under your TV if you've got the right back-end set up for it. Maybe it will be portable to ARMv6 and the Raspberry Pi as well. It's going to be interesting to see exactly how SteamOS shapes up.

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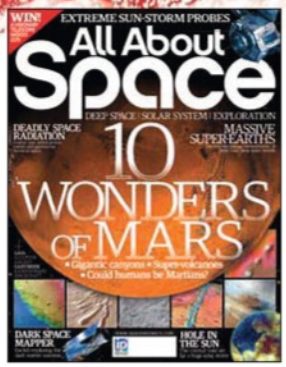

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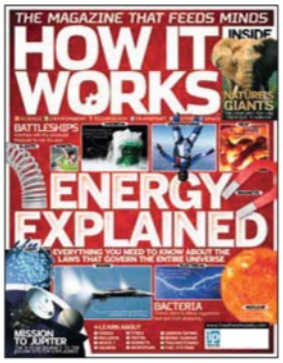

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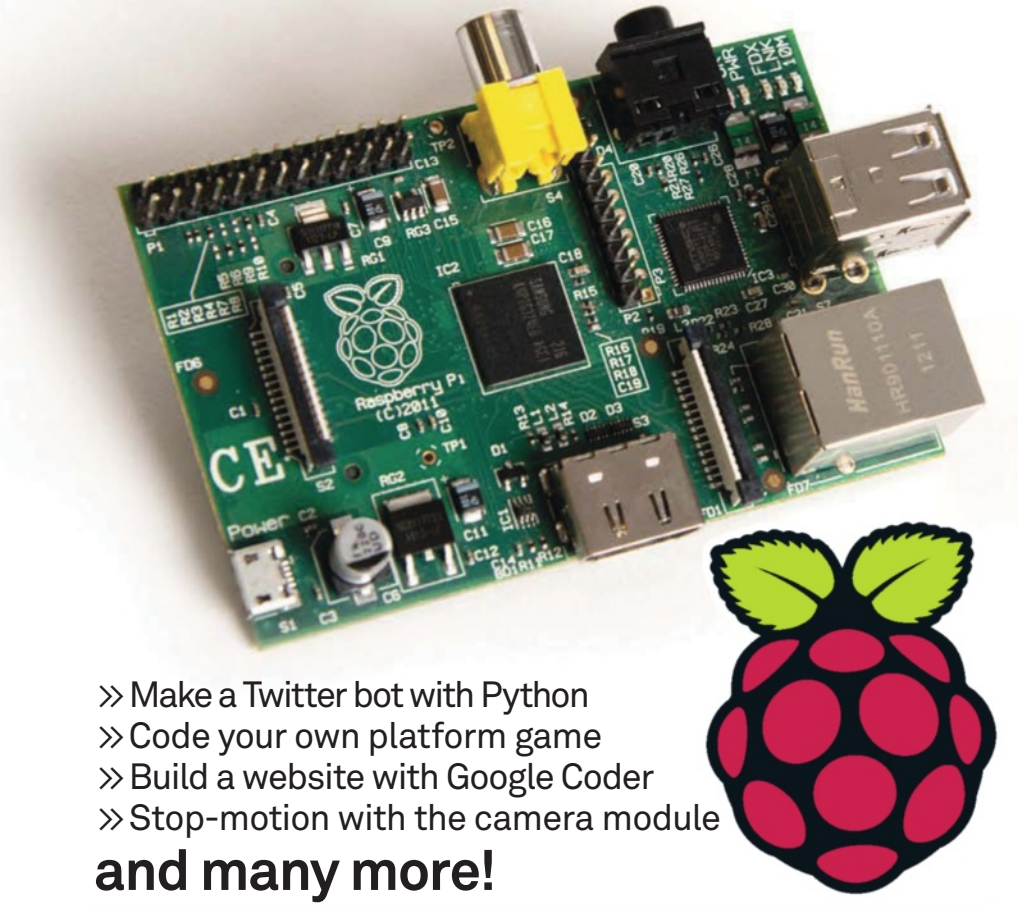

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THE MAGAZINE FOR THE GNU GENERATION

Imagine Publishing Ltd
Richmond House, 33 Richmond Hill
Bournemouth, Dorset, BH2 6EZ
☎ +44 (0) 1202 586200
Web: www.imagine-publishing.co.uk
www.linuxuser.co.uk
www.greatdigitalmags.com

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6 issue subscription (UK) – £25.15
13 issue subscription (Europe) – £70 (ROW) - £80

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Printed by William Gibbons, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT

Distributed in the UK & Eire by Seymour Distribution, 2 East Poultry Avenue, London, EC1A 9PT.
☎ 0207 429 4000

Distributed in Australia by Gordon & Gotch, Gordon & Gotch Corporate Centre, 26 Rodborough Road, Frenchs Forest, NSW 2086.
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Distributed in the Rest of the World by Marketforce, Blue Fin Building, 110 Southwark Street, London, SE1 0SU.
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