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CONTENTS

MARCH 2008
Issue 167



FEATURES

52 DESKTOP MUST-HAVES

Here's the guide to what you must have to slide easily into the Linux desktop experience.

Dan Sawyer

64 KDE 4 PREVIEW

A peek at the revolutionary new version of KDE.

Jes Hall

70 ORCA—TAKE THE KILLER WHALE FOR A RIDE

The Orca screen reader helps people with visual impairments access the desktop. It also can serve as a useful tool for developers to check their applications for accessibility.

Willie Walker

76 MAKE YOUR APPLICATION ACCESSIBLE WITH ACCERCISER

Find and solve access issues; your users will thank you.

Eitan Isaacson

ON THE COVER

- Must-Have Desktop Software, p. 52
- Interview with David Liu of gOS, p. 58
- Orca for the Visually Impaired, p. 70
- Make Your Desktop More Responsive, p. 88
- Promising Video Editors, p. 82
- Remote Desktop Sharing How-To, p. 22
- ASUS Eee PC, p. 42
- Lotus Symphony, p. 46
- Google Android, p. 48

58

BEHIND THE LOW-END LINUX BOX THAT SOLD OUT AT WAL-MART

Doc Searls interviews Dave Liu of gOS. Doc Searls



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Power consumption	~9W without extension cards, maximum - 35+ W
Operating System	MikroTik RouterOS v3, Level4 license

CONTENTS

MARCH 2008

Issue 167

COLUMNS

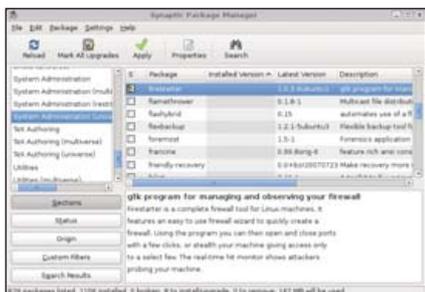
18 REUVEN M. LERNER'S
AT THE FORGE
OpenSocial and Google Gadgets

22 MARCEL GAGNÉ'S
COOKING WITH LINUX
My Desktop Lies over the Ocean



28 DAVE TAYLOR'S
WORK THE SHELL
Understanding Shell
Script Shorthand

30 MICK BAUER'S
PARANOID PENGUIN
Security Features in Ubuntu



36 KYLE RANKIN'S
HACK AND /
Automate Your Desktop
with wmcrtl

96 DOC SEARLS'
EOF
Driving Markets from Our
Own Kernels

IN EVERY ISSUE

8 LETTERS
14 UPFRONT
40 NEW PRODUCTS
81 ADVERTISERS INDEX

REVIEWS

42 ASUS EEE PC
Jes Hall



46 IBM'S UNFINISHED SYMPHONY
Bruce Byfield

48 DOMO ARIGATO MR
ANDROIDATO—AN
INTRODUCTION TO THE NEW
GOOGLE MOBILE LINUX
FRAMEWORK, ANDROID
Adam M. Dutko



48 ANDROID

INDEPTH

82 MULTITRACK VIDEO EDITOR
ROUNDUP
Video editing in Linux continues
to improve.
Dan Sawyer



88 MAXIMIZE DESKTOP SPEED
Linux is known for its speed,
even on older hardware, but
you will appreciate it even
more after making these
performance-enhancing tweaks.
Federico Kereki

Next Month

SYSTEM ADMINISTRATION

Next month, we feature articles on setting up a PXE server and adding menus to boot kickstart images and rescue disks from the network, cfengine for managing configuration files across large numbers of machines, and eliminating tape backups with FreeNAS and Bacula.

That's not all. We also look at how Linux is going green, take the new VMware Server 2 for a spin, and do a little hacking of ASUS's EEE PC.

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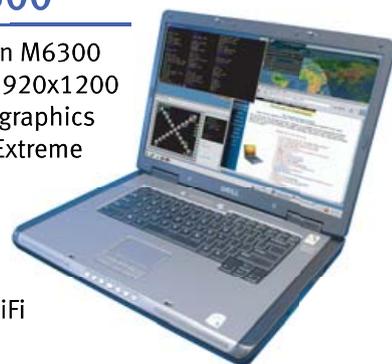
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letters



Calculator

Thanks for Dave Taylor's Work the Shell column in the December 2007 issue of *LJ*. I learned some new things from it. Truth be told, most of the articles in *LJ* are irrelevant to me, but I slow down and pay attention when I come to Dave's column.

Dave didn't mention it, but surely he knows about calc (isthe.com/chongo/tech/comp/calc)? This is a very powerful command-line calculator that I use often.

In the interest of full disclosure, Landon Curt Noll happens to be a personal friend who wrote calc long before I became acquainted with him. Keep doing what you're doing in *LJ*.

--
Bob

Dell Linux Systems

I'm part of the reason Dell is showing weak sales on Linux systems. I just purchased a slightly upgraded Dell Inspiron 530 for \$579.75 with Windows XP, and I'm reformatting and putting Linux on it the day it arrives.

I considered getting the identical FreeDOS or Ubuntu version, but they were several hundred dollars more expensive, because they offer only a

\$150 rebate instead of the \$360 rebate that you get with Windows!

Something stinks at Dell when a Linux or FreeDOS box costs \$210 more than an XP box.

--
Stanley Miller

Thanks for the Games

Thank you for three game articles in the December 2007 issue of *Linux Journal*. I am glad to see progress in Linux gaming. Games are the only reason I still have a Windows partition on my computer. The best first-person games are still only on Windows (*BioShock*, *Oblivion* and so on). Fortunately, my favored strategy game does have a Linux version: *Dominions 3* (www.shrapnelgames.com/llwinter/Dom3/1.htm).

--
Richard

More Business Content, Please

I was recently browsing through the archived articles of *Linux Journal* on www.linuxjournal.com, and I noticed that the past year or two has marked a decline in the number of articles targeted at business Linux users. Recent articles have focused more on home and educational users and developers than on the business administrator.

I understand that it's a struggle to find a balance between which audiences you target, but as the manager of an Information Technology department for a medium-size business, I would appreciate more focus on the business administration side of things. I'm looking for articles that give me good, detailed suggestions on how and where Linux can be useful to my organization. It's great to read an article about thin clients, LTSP and how the two can be used together in a lab environment for students in a school, but I don't have large lab environments with various people coming and going all day using the same machines. I have cubicles where the same people sit down at the same desks every day and use business applications, like Microsoft Office and Visual Studio. How about some articles that tell me how I can implement

OpenOffice.org without making my users angry and without making it impossible to interact with all of our customers and suppliers who use Microsoft Office? How about articles that present methods to migrate Microsoft Access Databases (I use the term "database" coupled with "Microsoft Access" very loosely) to open-source RDBMS systems with Web interfaces? Articles focusing on ERP systems for businesses? Of course, I'm not suggesting that you turn your attention entirely or even primarily toward business users (unless, of course, you'd like to fork another edition of *LJ*), just that you bring some of the focus back to that area. Also, I realize that Doc Searls has his Linux for Suits column, but the times I've read that, it seems to read more like the editorial page of a newspaper and less like a practical guide for implementing Linux in a business environment.

Finally, because of some of the editorial comments I've read in *LJ* about the Novell/Microsoft agreement, I have to put in my two bits about the deal. I understand the strong anti-Microsoft reaction of Linux purists everywhere, I realize that it certainly isn't an ideal situation, and I understand the wary attitudes with which people approach the deal and say, "What kind of stunt is Microsoft going to pull this time?" That's all completely understandable. However, as I said before, I manage an IT department, and Novell is helping me save loads of money on Microsoft licensing and is providing some very promising prospects for alternatives to Microsoft software in the very near future, along with some prospects for more interoperable systems between Microsoft's software and non-Microsoft software. Of course, I, too, am a bit cautious about what Microsoft sees in the deal, but I'm also a very satisfied Novell customer and see a lot of potential for their products to, at the very least, become a gateway out of the Microsoft world and into open source.

--
Nick Couchman

We appreciate your comments Nick, and we'll try to include more business-oriented articles soon.

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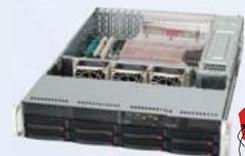
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Baffled

I have been a reader of *Linux Journal* for many years and find something to enjoy in every issue. I was, however, somewhat baffled by your inclusion of Sandeep Sahore's Tech Tip on his program showdate in the November 2007 issue.

Although it is indeed very useful to determine dates in the past and future, showdate is entirely unnecessary, and by the author's own admission, broken and quirky.

May I present GNU date, included with every distribution of Linux I have ever used (source available for your favorite UNIX, naturally). For the benefit of your readers, I have duplicated the examples from the showdate Tech Tip and added a few more.

The date ten years ago:

```
$ date --date="10 years ago"
```

Same as above in epoch seconds:

```
$ date --date="10 years ago" +%s
```

Five years, two months and 23 days from now in the format YY-MM-DD:

```
$ date --date="+5 years +2 months +23 days" +%y-%m-%d
```

With date, when you combine + and - in one command, it does the right thing (unlike showdate):

```
$ date +%y-%m-%d
```

```
07-12-05 (now)
```

```
$ date --date="-5 years +2 months +23 days" +%y-%m-%d
03-02-28 (2 months and 23 days after 5 years ago)
```

Schedule an at job 12 minutes and 35 seconds from now:

```
$ at -t $(date --date="+12 minutes +35 seconds" +%Y%m%d%H%M.%S)
```

Date isn't broken by large numbers:

```
$ date --date="+1000 years"
```

```
Sat Dec 5 16:41:40 EST 3007
```

```
$ date --date="+10000 years"
```

```
Wed Dec 5 17:01:17 EST 12007
```

Date understands weeks too:

```
$ date --date="+3 weeks"
```

Date is even more flexible, for example, all of the following are valid:

```
$ date --date="yesterday"
```

```
$ date --date="tomorrow"
```

```
$ date --date="last thursday"
```

```
$ date --date="+2 weeks yesterday" (two weeks from yesterday)
```

In fairness, like many GNU programs, a lot of the above is documented only on the info page (not the man page).

--
Joshua

Determinism

I enjoyed Roman Shaposhnik's article "Roman's Law and Fast Processing with Multiple CPU Cores" in the November 2007 issue of *LJ*, but he too briefly touched on an issue with large future implications. The problem isn't finding ways to make threads more deterministic; the problem is in our assumption that computers should be deterministic. A reliance on determinism works for processing on 8, or 16, or even 256 cores, but what about 256,000 cores? Or 256 million cores? As elements flicker in and out due to errors and faults, these creations will be better imagined as statistical ensembles than simple machines, no matter how many OSI-like layers are created. As a developer, you can become comfortable with ways to flesh out the gotchas that occur in parallel environments, but there is only so far that tools and insights can go if they are based on the wrong foundation. At some point in the future, we'll need to trade our Boolean yes or no for a Bayesian degree

of belief. The software community has started to get a taste of this in loosely coupled aggregates like grids, but there is much, much more to come.

--
Jon Dunfee

Another Tip on a Tip

This is in response to the Tech Tip on page 92 of the January 2008 issue, "Removing Duplicate Lines in Unsorted Text without Losing Input Order". If you have Perl installed (most distros do), you could do it like this:

```
$ perl -ne '$x{$_}++||print' /tmp/numbers
```

--
John W. Krahn

Bash Can Do It

I was surprised and dismayed to see Dave Taylor resort to Perl to map letters to numeric values, in his January 2008 Work the Shell column. He states that the shell can't do this easily: "There's nothing I can imagine without extraor-

dinary levels of effort."

Perl is not needed; bash can do the same thing easily:

```
ordvalue=$(printf "%d\n" "'$letter'" -96)
```

--
Russ Turner

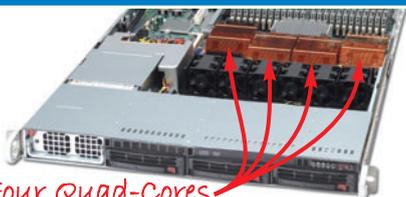
Dave Taylor replies: Cool. I didn't know you could do that!

Iceweasel Clarification

In the January 2008 issue of *Linux Journal*, Kyle Rankin wrote an article concerning anonymous Web browsing. Although the bulk of his content appears accurate, I noticed a fairly big mistake in one reference regarding the Knoppix LiveCD. He refers to Iceweasel as "Firefox's name on Knoppix". This is inaccurate. Iceweasel is the forked browser based on Firefox, built initially by the Debian distribution. Iceweasel relieves the non-free issues that are part of the Firefox browser, as the Firefox browser cannot be redistributed

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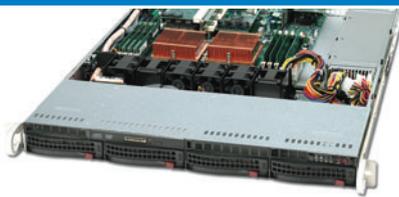
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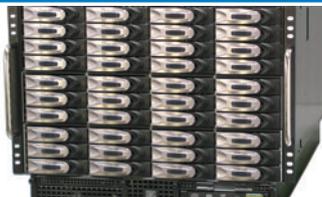


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Get a Clue

Mick Bauer's column "Getting a Clue with WebGoat", in the January 2008 issue of *LJ*, was missing a few clues. After some trial and error using Ubuntu 7.10, I found all the "Gutsy" clues. Mr Bauer left me clueless on setting the JAVA_HOME variable. The QRG is:

```
$ sudo apt-get install sun-java5-jdk
$ export JAVA_HOME=/usr/lib/jvm/java-1.5.0-sun-1.5.0.13
$ wget http://webgoat.googlecode.com/files/
↳ Unix_WebGoat-5.0_Release.zip
$ unzip Unix_WebGoat*.zip
$ wget
http://downloads.sourceforge.net/owasp/
↳ webscarab-installer-20070504-1631.jar?modtime=1178324741
$ java -jar webscarab-installer-20070504-1631.jar
$ java -jar "/home/username/WebScarab/webscarab.jar"
$ sudo sh ./webgoat.sh start80
```

What doesn't kill me makes me better.

PS. I like (intentionally, I hope) that the use of Tomcat was installed with WebGoat and that in the same issue Alan Berg had an article on efficiency tricks with Apache and Tomcat titled "Separate the Static from the Dynamic with Tomcat and Apache". As my first use of Tomcat was with WebGoat, touching on Tomcat later in the issue gave me a chance to further explore Tomcat. Bravo.

--
sbaker813

using the Mozilla Firefox name or logo if any changes are made by a distribution.

--
Christer Edwards

GRUB Security

I enjoyed the "The Tao of Linux Security" article by Jeremiah Bowling in the January 2008 issue of *Linux Journal*. I do have one small tip for the author, however. He suggests setting a password to the GRUB bootloader by adding password yourpasswordhere below the timeout line in the GRUB config file. Although this is technically accurate, if we're shooting for security, let's try not to leave passwords lying around in plain text.

Most major distributions should ship with the `grub-md5-crypt` command that allows you to generate md5-hashed passphrases for the GRUB bootloader. I suggest that anyone applying a GRUB security model would use this tool to generate an md5-hashed password and use that via the syntax `password --md5 pasteyourmd5hashhere`.

--
Christer Edwards

More Work the Shell Tips

In the January 2008 issue of *Linux Journal*, Dave Taylor is musing over "how do you step through a word, letter by letter, in a shell script", and later, "how do you convert characters into corresponding numerical codes". Here is how (bash):

```
in=linux
while [ -n "$in" ]; do
    val=$((printf %d "'${in:0:1}" - 96))
    echo "... letter ${in:0:1} has value $val"
    in=${in:1}
done
```

As for the Perl code used later in the same article, the simplest way to get from a string a list of corresponding byte codes is to use `unpack` with a `C*` or `c*` pattern. So the following Perl gives the result he is after:

```
@values = map {$_ - 96} unpack "C*", "linux";
```

A corresponding list of "letter keys" will be produced by `split //, "linux";`. Of course, variables could be used in place of literal strings.

--
Michal Jaegermann

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diff -u

WHAT'S NEW IN KERNEL DEVELOPMENT

The **2.4 kernel** looks more and more immobile. Except for bug fixes, it no longer seems to be the case that any new code will be accepted. Even clean, well-written, minimally invasive driver ports from the 2.6 tree now are being turned away, as **Vitaliy Ivanov** recently discovered. He'd ported the **adutux driver** to 2.4 and submitted it, only to be told by **Willy Tarreau** that the driver would not be accepted, because no one used the relevant hardware on 2.4 systems. The fact that this may be because the driver has not been available was met with the argument that people who may have needed such a driver probably already have found different hardware to solve their problem. And, Willy added, because the 2.4 tree was not changing so quickly these days, those who did want the patch would have no trouble applying it themselves.

Vitaliy was a bit disappointed and surprised by this. But, in spite of the rejection, Willy and other top hackers still helped Vitaliy get the patch into the best possible shape, in case anyone ever did want to apply it. The patch apparently now will live in Willy's own personal tree, which gathers together 2.4 patches that are unlikely to make it into the official tree.

The **hardware4linux.info** site has come on-line, providing a database of hardware and its interoperability with the various Linux distributions that exist in the wild. Like similar projects, this one relies on user-contributed data.

It's possible that the **Linux-tiny Project** will be started up again, under **Michael Opdenacker's** leadership, but there seems to be considerable opposition. Linux-tiny is a general effort to make the kernel smaller, both in RAM and on disk, and to provide a central location to submit all such patches, so they can be fed to **Andrew Morton** or **Linus Torvalds**. But, several folks, including Andrew, felt there was no need for a central location beyond the kernel itself. His feeling is that any patches that can help make the kernel smaller should be submitted to him, rather than

to Michael or anybody else.

However, as a lot of these patches already have collected around Michael, he feels he's still needed to help organize them and present them to Andrew or whomever. So, there does seem to be the sense that Linux-tiny is needed, in spite of the fact that folks like Andrew are very much opposed. It seems as though this could shake out either way.

A very interesting new **distributed filesystem** has hit the scene, created by **Sage Weil** as part of his PhD studies. It's been under development for a while now, but Sage has just made his first official announcement. As a result, the filesystem is likely to be more stable than other filesystems at the time of their initial announcement; however, because of the lack of testing, users probably should not trust **Ceph** with their data until it has had a bit more time under the spotlight.

Ceph supports the familiar **POSIX** filesystem semantics and distributes its data across an arbitrary number of nodes on a network. Data is replicated and rebalanced behind the scenes, so the loss of only a small number of nodes would be unlikely to cause any data loss.

Originally, the filesystem client itself had been done in **FUSE**, which made for rapid development at the cost of some speed and correctness. One of the reasons Sage chose to make his announcement now is that he has begun work on an in-kernel client, which addresses all the correctness and efficiency issues.

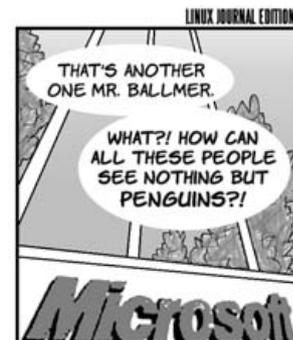
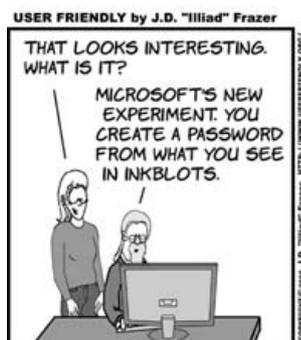
Adrian Bunk wants to take away the **Experimental configuration dependency**. The idea behind Experimental was that users could choose not to see a large swath of unstable configuration options and, thus, focus only on the options that seemed the most thoroughly

tested and reliable. If, during kernel configuration, users clicked on the "Enable experimental features" option, they suddenly would see all the weird stuff that hadn't yet stabilized. The great value of the Experimental option was that it allowed newer code to have the widest possible distribution among users, without putting users in a position to harm themselves by inadvertently enabling a feature that would somehow or other trash their systems.

Unfortunately, according to Adrian, so many necessary drivers still are listed as experimental, that distributions have been enabling experimental features by default in their production kernels. In many cases, these drivers have not really been experimental for a long time, but their developers just never bothered to remove the dependency. So now, users have none of the benefit of being able to turn off experimental features. If they want to use their system at all, in many cases, they are obliged to enable experimental features and hope they don't inadvertently enable something else that is less stable.

It's unclear what ultimately will become of the feature. Clearly, many experimental features in the kernel would have to be removed entirely, if there were no way to hide them from users who wanted only the most solid features. If Adrian does remove the Experimental option and nothing replaces it, all those features may lose out on their current high level of availability to new users. Meanwhile, the drivers that had caused the whole problem by failing to remove their dependency on the Experimental option would get to stay in the kernel, because they are not really experimental.

—ZACK BROWN



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9. Lines of code searched by Koders.com: **766,893,913**
10. Lines of code searched by KruglePublic, in billions: **2.6**
11. Code repositories searched by Krugle.com: **600**
12. Thousands of projects searched by KruglePublic: **100**
13. Number of projects registered at SourceForge: **164,138**
14. Number of users registered at SourceForge: **1,744,635**
15. Service listings in SourceForge Marketplace at launch: **600**
16. Millions of Linux-based mobile handsets sold by Motorola: **9**
17. Percentage of Motorola's handset portfolio served by the company's Linux MotoMagx platform: **60**
18. Percentage of Linux CPUs running AMD Athlon: **14.71**
19. Percentage of Linux CPUs running Pentium 4: **12.15**
20. Percentage of Linux CPUs running other Pentiums: **24.97**

Sources: 1–3: AOL | 4–8: AdAge
9: Koders.com | 10–12: Krugle.com
13, 14: SourceForge.net | 15: CNN.com
16, 17: AmericasNetwork.com
18–20: Linux Counter (counter.li.org);
numbers gathered by December 9, 2007

The Linux Muse

Convergent Living keeps expanding its portfolio of Companion-branded home electronics controllers, all of which involve “server-less smart appliances running rock-solid Linux”. All are intended to work with the company's own components or with those of many other manufacturers. At the time of this writing, Convergent Living's Integrated Mode Subsystem Drivers supported the following:

- 21 scene lighting systems.
- Ten distributed audio/video multi-room preamps (with two “coming”).
- Five media audio streamers.
- 14 digital media servers.
- Three I/serial-based components.
- Four security panels.
- Seven automation panels.
- Five I cameras, plus “almost any streaming MPEG-3 camera”.

It also supported a pile of Ethernet converters; VGA/USB extenders via CAT5; a serial router and communications to



thermostats, humidifiers, shade controls, weather stations; and other “environmental” electronics by several manufacturers, over an array of data link types.

Its latest controller is the Companion Muse, which communicates to both the Net and local home electronics over Wi-Fi. It has a built-in Web browser, plus the ability to control home systems either through IP (Internet Protocol) connections or through “translators” that speak through serial, IR and other interfaces.

The Muse weighs just less than two pounds and runs on an 800MHz LX-800 Geode processor. It has an 8.4" TFT Active Matrix 800x600 SVGA LCD touchscreen, talks 802.11b Wi-Fi and plays 16-bit audio through either a built-in speaker or a headphone jack. It's recharged through a desk cradle or USB passthrough.

Configuring and integrating widely disparate home electronics tend to be complex professional work, so Convergent Living sells its components through professional integrators. Meanwhile, as the line continues to expand, it demonstrates the handiness of Linux as a solid platform for integrating just about anything.

RESOURCES

- Convergent Living, Companion:
www.convergentliving.com/index.php?option=content&task=view&id=15,
www.convergentliving.com/index.php?option=com_content&task=view&id=43&Itemid=67
and www.convergentliving.com/index.php?option=content&task=view&id=28
- “Linux touchpanel automates homes, boardrooms”:
www.linuxdevices.com/news/NS8523585083.html
- “Device Profile: Convergent Muse touchscreen automation controller”:
linuxdevices.com/articles/AT6599836729.html

—DOC SEARLS

Distro Share Distribution

Linux Counter (counter.li.org) has been keeping track of many things for many years. One of those things is distro share percentages. Here is how they stacked up, as of December 9, 2007. The data is derived from 147,964 registrations entered and 151,087 values.

—DOC SEARLS

Distro Share Percentages

Distribution	Count	Percent
CentOS	1,190	0.80%
Debian	28,949	19.56%
Fedora Core	10,451	7.06%
Gentoo	12,642	8.54%
Kubuntu	1,837	1.24%
Mandrake	7,602	5.14%
Mandriva	2,870	1.94%
Red Hat	11,349	7.67%
SUSE	14,757	9.97%
Slackware	13,166	8.90%
Ubuntu	19,490	13.17%
Others	26,783	18.10%

Linux as an RTOS

Linux success in the embedded space is well established. In October 2007, VDC reported that Linux held a 40% share among embedded operating system choices by system developers. Smaller share slices were held by commercial OS vendors, in-house, "other" and "no formal OS". In the Linux wedge, free Linux distributions outpaced paid ones by more than two to one. And, the free side was trending upward, with free distros outpacing paid ones by more than four to one among future embedded project deployment plans.

But, that's just one source of stats. More recently, Embedded Market Forecasters (EMF) came out with a report titled "Embedded Linux Total Cost of Development Analyzed", which it says is based on interviews with more than 1,300 embedded developers. In its summary, EMF reported the following:

- "Embedded Linux has achieved design parity with commercial RTOSes for most projects."
- "Embedded Linux design outcomes are consistent with the outcomes of projects using OSes from commercial RTOS vendors."
- "Use of a commercial embedded Linux OS is more effective than a noncommercial 'in-house' Linux development undertaking."
- "Embedded Linux can be used in a mission-critical environment that requires MILS (Multiple Independent Levels of Security) or EAL (Evaluation Assurance Level) certification or POSIX (Portable Operating System Interface) conformance, when used in protected memory under a certified RTOS."

Dr Jerry Krasner, President of EMF and author of the report, said, "This study shows that designing with an embedded Linux OS can be as dependable as designing with an RTOS."

RESOURCES

- "Linux to remain a leading embedded OS, says analyst": www.linuxdevices.com/news/NS2335393489.html
- Embedded Market Forecasters, "Poor development tool selection costing embedded developers an average of \$553,000 per project": www.embeddedforecast.com/images/MDD_Release_052107.pdf

—DOC SEARLS

New Features at LinuxJournal.com

If you haven't visited us recently, you may have missed *Linux Journal's* Gadget Guy, Shawn Powers, and his video product reviews. Each week, Shawn has entertained and informed while giving viewers a peek at some interesting Linux-powered gadgets, such as the popular ASUS Eee PC, the Z2 Zipit Wireless Messenger and the Neuros MPEG-4 recorder. Be sure to come back

to see what other cool toys he will get his hands on.

Also, take a look at the section aptly named "Live from the Field" to get some interesting perspectives and perhaps even a behind-the-scenes look at *Linux Journal* from our very own staff and advisory board. These folks tend to have some useful information to share, and you might even get a look

at some of their geek gear. After the holidays, many of us posted photos and videos of our geekiest gifts for all to see. If you haven't seen these, they are worth checking out and can be found at www.linuxjournal.com/microblog.

Drop by and write your thoughts in the comments sections or in the forums. We'd love to hear from you.

—KATHERINE DRUCKMAN

What Are They Using?

Each month, we'll be featuring a fun Linux implementation by a notable user. Launching the series is Wendy Selzer. A founder of Openlaw, its open DVD forum and the Digital Effects Clearing House, she also was a star attorney with the Electronic Frontier Foundation, where she led EFF's Digital Television Liberation Front, fighting restrictive government technology mandates with open-source software. These days, she lives near Boston, where she serves as assistant professor at Northeastern University School of Law and fellow with the Berkman Center for Internet and Society at Harvard Law School.

Here's Wendy:

I'm using MythTV to power my home entertainment system. The combination digital video recorder, jukebox, streaming audio server and Web browser is a Debian-based Pentium 4 running MythTV and other free software.

I built this machine when the Broadcast Flag was threatening the continued availability of open high-definition television tuners, but since public interest groups (including the American Library Association, Electronic Frontier Foundation and Public Knowledge) defeated the Broadcast Flag, the hardware is still available, and Moore's Law makes it cheaper all the time. (Full specs at wendy.seltzer.org/mythtv; the large-screen TVs pictured aren't mine.)

The DVR picks up over-the-air television in HD and standard def, recording a mix of programs I've directly selected, TiVo-like "season passes" and those it gleans from searches or community-generated lists. Whenever a "best movie of all time" or nature program comes up, I can time-shift it to fit my schedule. If I'd rather watch the "NewsHour" in half an hour, I can time-squeeze it to fit. Independent video from YouTube and Miro round out the mix.

Ripping my CDs to lossless FLAC files gives me a jukebox from which I can select playlists to listen to on my living-room stereo, stream to the study or office, or move to a pocket. I can record the Metropolitan Opera's Saturday matinee broadcasts (streamripper from a crontab) and pull up Wikipedia pages or libretti alongside.

The system that started as a political statement has become immensely practical (and fun). The general-purpose computer lets me watch media as I want to see or hear it. We just have to make sure the media stays unencumbered and the technologies aren't hampered by ill-designed mandates from Hollywood.

—DOC SEARLS

They Said It

Data likes to meet, have sex and make babies, just make sure it happens in *your* hotel room.

—Martin Geddes, psd on Twitter, December 6, 2007

Put it all together, and here's what I see happening. In the next few quarters, low-end Linux-based PCs are going to quickly take over the bottom rung of computing. Then, as businesses continue to get comfortable with SaaS (software as a service) and open-source software, the price benefits will start leading them toward switching to the new Linux/SaaS office model.

You'll see this really kick into gear once Vista Service Pack 1 appears and business customers start seriously looking at what it will cost to migrate to Vista. That Tiffany-level price tag will make all but the most Microsoft-centric businesses start considering the Linux/SaaS alternative.

—Steven J. Vaughan-Nichols, www.desktoplinux.com/news/NS2414535067.html

Sun will be announcing a multi-year award program in support of fostering innovation and advancing open source within our Open Source communities. We'll be providing a substantial prize purse and working with the communities involved to develop the approach that works best.

—Simon Phipps, Sun Microsystems, blogs.sun.com/webmink/entry/getting_paid_to_develop

TECH TIP Avoid "Argument list too long" Errors

The shell has a maximum length for command-line arguments. If you try to pass more than the maximum, you will receive an error:

`Argument list too long`

For example, to find which files contain a particular string, you normally would do the following:

```
grep -l STRING
```

But, if there are too many files, you may get the "Argument list too long" error. In that case, you could do:

```
ls | xargs grep -l STRING
```

—ALESSANDRO PAIUSCO



REUVEN M. LERNER

OpenSocial and Google Gadgets

Thinking about developing an OpenSocial application? First, you'll need to understand Google Gadgets.

The past few months, I've written about the Facebook API, which allows third-party developers to integrate their applications into Facebook. A large number of such applications exist already, and more are being created and released every day.

However, Facebook isn't the only social-networking site out there. Indeed, Facebook isn't even the largest social-networking site—although it is the fastest-growing and seems to have a great deal of momentum. This is due in no small part to developers' ability to create and integrate new applications into Facebook. And, although most Facebook applications are (I think) pretty silly, that hasn't stopped people from trying them and even using them on a regular basis.

Facebook's offer of a developer API definitely was a good thing for Facebook users. But, it was bad news for at least three other groups of people. First, users of other social-networking systems suddenly were faced with the prospect of using a less-popular system. (In the world of social networking, a less-popular system also is less desirable.) Second, the people running non-Facebook social-networking sites, such as LinkedIn and MySpace, suddenly were faced with the prospect of their users leaving for Facebook. Finally, software developers began to look at Facebook as the most-desirable platform for which they should develop, because it had the largest user base. Even if one or more of the competing sites were to unveil an API, and even if it were as rich as the Facebook API, it probably wouldn't reach enough users to make the doubled effort worthwhile.

So, I was fascinated to learn, via Marc Andreessen's blog, that a number of social-networking sites were responding to Facebook in a way that satisfied all three of these populations. They announced an API that would allow an application to work across many different social-networking sites. This API, known as OpenSocial, can be added to any site ("container") or application. If you write a Facebook application, it'll work only on Facebook. But, if you write an OpenSocial application, it'll work under Ning, MySpace, Orkut and nearly a dozen other systems.

Of course, OpenSocial isn't exactly the same as the Facebook API. And, in fact, it has some disadvantages

when compared with the Facebook API. Also, as I write these words in mid-December 2007, OpenSocial still is stuck in an early beta release.

However, OpenSocial is interesting from a few perspectives. First, it's an interesting shot across Facebook's bow, and one that deserves our attention, if only because it demonstrates the lengths to which companies now will go to attract developers and users. But, it's also interesting because it's the first application standard I can think of that is based on HTTP, JavaScript and HTML. That is, I believe OpenSocial is the first Web development API that is completely client-side, rather than server-side. If nothing else, this shows how important JavaScript has become to Web developers.

This month, we start looking at OpenSocial from the perspective of an application developer. OpenSocial builds on work done at Google; thus, it's based on several technologies developed at Google, including Google Gadgets. So, let's begin our discussion of OpenSocial by looking at Google Gadgets and how we can create and use them. Next month, we'll look at how to turn a simple gadget into a social gadget and connect it with OpenSocial containers.

Google Gadgets

An OpenSocial application is, at heart, a combination of XML and JavaScript, using a special version of Google Gadgets. The code is written in JavaScript, and preferences and guidelines for the gadget are set using XML. The simplest possible gadget, taken from Google's on-line documentation, is the following:

```
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs title="Hello world" />
  <Content type="html">
    <![CDATA[
      Hello, world!
    ]]>
  </Content>
</Module>
```

The above gadget, as you can imagine, doesn't do very much. The first line shows that it's an XML document and that it's encoded using UTF-8. This means we can write gadgets in any language we like, and they should work correctly. The gadget is then contained inside <Module> tags, apparently because gadgets were called modules when they were under development. The content of a gadget sits inside a <Module>.

There are three potential sections inside a gadget:

- **ModulePrefs:** defines the settings for a particular gadget.
- **Content:** contains the HTML that is displayed for the user, as well as any JavaScript code with which the user will interact.
- **UserPrefs:** used to store user preferences.

The above test gadget doesn't contain any UserPrefs, and its Content section contains only HTML, but it still is valid.

To see this gadget in action, you need to create an iGoogle page. This requires having a Google login. (I'm familiar with the privacy concerns that are increasingly raised about Google. OpenSocial will not be tied to Google; thus, it doesn't require a Google login. However, for the time being, it's easiest to create a gadget for an iGoogle page.) Go to your personal iGoogle page: google.com/ig.

On the right side of the screen is a link called Add stuff. This is how you add new gadgets to your personal iGoogle page. By default, it shows the most popular gadgets, and you're obviously welcome to add as many or as few of these gadgets as you want. However, if you're going to be developing gadgets, add the My Gadgets gadget, which gives you some additional control and functionality. Use the search box to find My gadgets, and when you find it in the search-result listing, click on the add it now link. You will be brought back to your iGoogle page, with this new gadget now available.

Publishing Your Gadget

Google has tried to make gadget development as easy as possible. One way it eases the learning curve has been through the creation of many on-line tools that remove the editing and storage needs for many developers. Thus, although many Web developers (like me, and possibly you) are happy to write programs in Emacs and put them on their own private Web servers, Google realized that not everyone has access to (or familiarity with) such tools. So, Google provides a Web-based editor (GGE, the Google Gadget Editor), which not only lets people edit their own gadgets via a Web browser,

but also provides free storage for gadgets.

I'm going to take a more traditional route to storage in this column, although you're welcome to ignore my example. I'll be putting my gadgets on my Web server (atf.lerner.co.il). To incorporate these gadgets into my iGoogle page, I must go to the My Gadgets gadget and enter the complete URL of the gadget. For example, I stored the above "Hello, world" gadget on my server as `rmlgadget1.xml`. Thus, I entered the following URL into My Gadgets: `http://atf.lerner.co.il/rmlgadget1.xml`.

Sure enough, after a moment of loading, I saw "Hello, world!" on my iGoogle screen. Each gadget is displayed inside an `iframe`, an HTML entity that allows the developer to create content that's independent of its surroundings. Or, thinking about it in a different way, the `iframes` ensure that gadgets cannot interfere with one another but stay "locked" inside their frames.

More Interesting Gadgets

It goes without saying that most developers would not be content to produce "Hello, world" programs. Rather, we typically want to do something a bit more substantive.

In order to do that, we need to create a bit more HTML inside the <Content> section. We probably should create some JavaScript that manipulates that HTML as well, given that we have a completely open canvas.

Note that I'm going to modify the original gadget I created, which I named `rmlgadget1`. Google caches gadgets, which means that once you have loaded one on to your iGoogle page, modifications made to the gadget won't show up. This is when you must fire up your trusty My Gadgets gadget, and uncheck the cached check box for the gadget (in my example, `rmlgadget1`). Reloading the iGoogle page will reload the gadget from the Web server, allowing you to have a more interactive and productive development experience.

Here's one update that demonstrates how to use JavaScript inside the gadget:

```
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs title="Hello world" />
  <Content type="html">
    <![CDATA[
      <div id="content">Hello, world!</div>
      <script type="text/javascript">
        var element =
document.getElementById('content');
        element.innerHTML = "Foo";
      </script>
    ]]>
  ]>
```

```
</Content>
</Module>
```

Once again, there's not much content to this widget. We simply use JavaScript and the DOM to modify the contents of a div. So, let's make things a bit more interesting and retrieve the latest headlines from *Linux Journal's* RSS feed. Then, we can display the first few headlines, even making them linkable:

```
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs title="Reuven's Gadget" />
  <Content type="html">
    <![CDATA[
      <div id="content">Loading feeds...</div>
      <script type="text/javascript">
        var html = '';
        var url = "http://feeds.feedburner.com/linuxjournalcom";
        var callback = function(feed) {

          html += "<ul>\n";
          for (var counter = 0; counter < feed.Entry.length;
counter++) {
            html += "<li>" + '<a href="' +
feed.Entry[counter].Link + '" ta\
rget="_blank">' + feed.Entry[counter].Title + "</a>" + "</li>\n";
          }
          html += "</ul>\n";

          _gel('content').innerHTML = html;
        };

        var num_entries = 5;
        var get_summaries = false;
        _IG_FetchFeedAsJSON(url, callback, num_entries, get_summaries);
      </script>
    ]]>
  </Content>
</Module>
```

The above gadget code begins with the same sort of static code as our previous gadget, although I did change it from saying "Hello, world" to something a bit more useful ("Loading feeds..."), because this text will appear while the feeds are loaded.

The JavaScript in this gadget is somewhat interesting, mostly because it depends on the `_IG_FetchFeedAsJSON` function, which Google provides to gadget developers. This function takes four arguments, and the first two are mandatory—the URL from which to fetch the arguments and the callback function that should be invoked when the feed is retrieved. For our example, I'm using the RSS/Atom feed URL for *Linux Journal* as provided by FeedBurner.com. Thus, we will get the list of recent

www.linuxjournal.com headlines, as defined by the site administrators.

The callback function, which I've named `callback` here, is invoked with a single argument, the JSON (JavaScript Object Notation), representing the feed that was retrieved from our URL. That JSON contains an array named `Entry`, whose elements contain the feed information. Each element contains `Title` and `Link` properties, which we will use to construct the output HTML.

When `callback` is invoked, we first go to FeedBurner.com and retrieve the five most-recent headlines:

```
_IG_FetchFeedAsJSON(url, callback, num_entries, get_summaries);
```

Then, we iterate over the elements of `Entry`, appending them to a variable we've conveniently named `html` and putting each `Title` inside an HTML link, which opens the target URL in a new tab or window (thanks to `target="_blank"`):

```
for (var counter = 0; counter < feed.Entry.length;
counter++) {
    html += "<li>" + '<a href="' +
feed.Entry[counter].Link + '" ta\
rget="_blank">' + feed.Entry[counter].Title + "</a>" + "</li>\n";
}
```

Finally, we assign our div (the one that starts by saying "Loading feeds..."):

```
_gel('content').innerHTML = html;
```

Sure enough, our gadget works very nicely, providing us with a dynamically updated list of headlines from *Linux Journal*. What could be better?

One of the most interesting characteristics of Google Gadgets is the way in which they are completely self-contained, insulated from the surrounding page and application. As I mentioned previously, this is because each gadget sits inside an `iframe`, and it undoubtedly was one of the reasons gadgets were used as the basis for OpenSocial.

However, we already can see how this will lead to a situation in which the application, rather than the hosting OpenSocial "container" site, determines the look and feel. This means if you include six OpenSocial applications, each one will have its own look and feel. This is a big difference from Facebook, in which applications are forced, to a large degree, to adhere to Facebook's look and feel, creating a rather pleasant user experience. Time will tell whether this causes problems or whether developers and users will reach a happy medium on this issue.

A separate issue is the fact that each gadget contains only a single page of HTML. Any updates

that take place within the gadget, as we saw, happen thanks to JavaScript manipulation of the DOM. This is not a bad thing, and it is becoming increasingly common as Ajax becomes more pervasive among Web developers. However, it may be slightly foreign for developers who are still using the one-page-per-click paradigm.

Conclusion

Google Gadgets are small, self-contained mini-pages written in a combination of XML, HTML and JavaScript. They may be hosted by Google or on your own server, and to date, they primarily have been used for the personalized iGoogle service. However, Google Gadgets now form the foundation of OpenSocial, an open application standard used by social-networking sites other than Facebook. Next month, we will see how to convert our Google Gadgets into an OpenSocial application. ■

Reuven M. Lerner, a longtime Web/database developer and consultant, is a PhD candidate in learning sciences at Northwestern University, studying on-line learning communities. He recently returned (with his wife and three children) to their home in Modi'in, Israel, after four years in the Chicago area.

Resources

For the latest updates on OpenSocial, consult the Google group for OpenSocial at groups.google.com/group/opensocial. I particularly suggest looking at the list of recent activity, which is at groups.google.com/group/opensocial/web/whats-up-with-opensocial.

Extensive information about Google Gadgets can be found at code.google.com/apis/gadgets/docs/basic.html, including many examples. Some of the examples and instructions were slightly out of date, but with a bit of digging, you should be able to figure out what is going on.

To understand more about this month's specific example, which involved retrieving remote content, consult code.google.com/apis/gadgets/docs/remote-content.html.

Marc Andreessen, who cofounded Netscape and is now running the Ning site for creating social networks, writes a blog about the software industry, startups and OpenSocial at blog.pmarca.com.



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MARCEL GAGNÉ

My Desktop Lies over the Ocean

Because being there is open to interpretation.

You have been on the phone for an hour, François, and it is nearly time for our guests to arrive. Who are you talking to? Your cousin in Rivière-du-Loup? And, you're helping her with her Linux system? That is commendable, *mon ami*, but we have work to do. Yes, I realize it takes a great deal of time when you have to ask the other person to describe what she sees while you try to tell her what she should do next. It might be easier to demonstrate. Yes, I know she lives a few hundred kilometers away. With your Linux system and the right tools, being there doesn't have to mean hours and hours of driving. Wrap up your call quickly, and you'll learn everything you need to know when I serve up today's menu. *Vite!* Our guests are arriving as we speak.

Welcome, everyone, to *Chez Marcel*. It is a great pleasure to have you here, where fine Linux and open-source software meets great wine. Please, sit, while my faithful waiter takes a short trip to the wine cellar. François, please bring back the Collavini 2005 Villa Canlungo Pinot Grigio. Quickly, *mon ami*.

It only makes sense that being there, in person, to show somebody how to work with his or her system isn't always convenient. Taking control of an existing remote desktop session lets you work with the desktop as though you were there, without having to walk up a floor or drive several hundred miles. In that respect, it's not only a time-saver, but also environmentally-friendly (imagine having to fly overseas). Another great incentive for remote control is the office environment. Do you need to show users how to add an icon to their desktops? Connect to their desktops and let them watch. Have you received a call asking for help interpreting an error message? Connect to the system and ask the user to re-create the scenario while you watch. The possibilities are endless. Taking control of a remote desktop also provides everyone with a learning experience. For you, the person doing the teaching, it lets users show exactly how whatever went wrong, went wrong. For users, it lets them watch a master at work, so they too can learn the ways of Linux. This remote control is probably better referred to as desktop sharing.

Excellent, François has returned with the wine. *Mon ami*, after you have taken care of filling our

guests' glasses, please take care of mine as well.

Both of the most popular Linux desktop environments—KDE and GNOME—come equipped with excellent solutions for desktop sharing. With these tools, users can invite someone either to watch their desktop session or take control of it. In an office environment, system administrators also can set it up so they can take control whenever necessary. Let's start this tour with the KDE desktop sharing application.

On my Kubuntu Linux system, remote desktop sharing is under the Internet menu. The command



Figure 1. Invitations to desktop sharing come in different flavors.

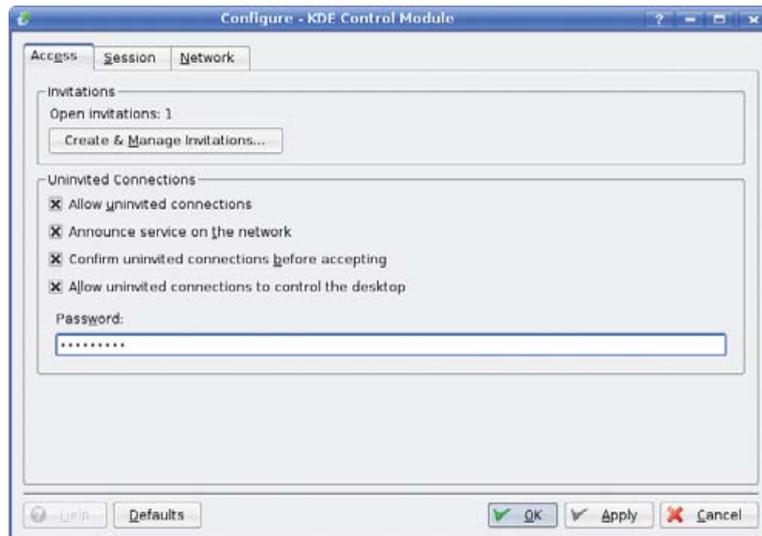


Figure 2. When you create a personal invitation, it expires an hour later.

name is `krfb`, if you want to start it directly using your Alt-F2 run dialog. When you do so, a window labeled Invitation - Krfb appears (Figure 1).

The window offers you three important choices. You can create either a New Personal Invitation or Invite via Email. The third button provides a more complex interface that allows you access to invitations that already have been created. You can delete existing invitations or create new personal invitations. There's also a Configure button at the bottom—a button that is of particular importance to system administrators. Let's leave those things for now and concentrate on creating a personal invitation. To do that, click the Create Personal Invitation button, and a window labeled Personal Invitation - Krfb appears (Figure 2).

For security reasons, the invitation itself lasts only an hour. If you don't do anything else, Desktop Sharing automatically comes up with a password and an expiration time for the session. The host address necessary for the connection also is displayed. Overriding either the password or the expiration time is not allowed. Make sure you pass on the



information as it is shown to the person who will be connecting. When you have passed on the information (or written it down), click Close.

The other option is an e-mail invitation, which is essentially the same thing, except the

Figure 3. Creating a persistent, uninvited connection adds convenience, but don't ignore security.

Expert included.

Forrest and the Product Development team never stop thinking about the problems facing today's IT administrators. Power efficiency, compute density, green computing, reliability, and serviceability are just some of the things he makes a priority. That's why Forrest is excited about the new Bladeform 8840 Blade for the Bladeform 8100 Series Blade Server Platform. Each Bladeform 8840 Blade supports four Quad-Core AMD Opteron™ 8000 Series processors. With 16 cores per blade and 10 blades per 7U enclosure, you can pack the power of 960 cores in a 42U rack.

At the same time, Forrest is very impressed that the Bladeform 8100 provides 90%+ high-efficiency redundant power supplies for operating cost reduction and earth-friendly computing. The Bladeform 8100 with the Bladeform 8840 Blade is a perfect choice for mission-critical enterprise applications as well as scale-out and high performance computing environments.

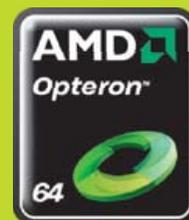
When you partner with Silicon Mechanics, you get more than a high-efficiency AMD solution—you get an expert like Forrest.



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Incidentally, both the KDE remote client and the GNOME Terminal Server Client also let you connect to an RDP session as well.

connection details are sent via e-mail rather than read over the phone. The only catch here is that you are sending the means to access your system via e-mail during that one-hour period. If you choose this option, you'll receive a warning about plain-text e-mail over the Internet and the wisdom of encrypting said e-mail. Click Continue to get past the warning, and a KMail message appears (with instructions on how to connect), ready for you to click Send. If no one answers the invitation, it disappears within an hour.

Before we move on, click Close to get past all those invitations, and we'll have a look at another means of providing access—uninvited connections (that's our mysterious Configure button). If sending an e-mail invitation presents interesting security concerns, a wide-open, permanent invitation should ring additional bells. Nevertheless, in an office environment, it also may be the sanest method of giving yourself access. Click the Configure button to bring up the Configure dialog from the KDE Control Centre (Figure 3). Yes, that is correct. This configuration dialog also is available by running the KDE Control Centre from the K menu (or by using the `kcontrol` command name) and looking under the Internet & Network menu for Desktop Sharing.

If you check the Allow uninvited connections box, you still have to assign a password for connecting. Furthermore, you have the opportunity to "Confirm uninvited connections before accepting". You also can decide whether to give those uninvited connections the ability to control the desktop. If you don't check the latter, users can give you control at any time by selecting the desktop sharing icon that

Note:

The IP address displayed may be an issue if you are trying to connect to a remote system that is on the other side of a home router or firewall. In those instances, you may need to set up a port redirect to allow port 5900 to connect to the PC you need to access. Because the way to do this varies from ISP to ISP and router manufacturer to router manufacturer, there isn't a quick way to explain it here. Your router documentation should cover this.



Figure 4. GNOME's remote desktop invitation is run by a command named `vino-server`. Suddenly, I'm thirsty.

appears in their system tray.

On the GNOME side of things, there's a program called Remote Desktop Sharing. On a typical GNOME setup, click System on the top menu bar, then look under Preferences for Remote Desktop (if you like, you can run the command directly using `/usr/lib/vino/vino-server`). The Remote Desktop Preferences menu appears as shown in Figure 4. Needless to say, I love the name.

Some of this is going to look very familiar, because many of the questions mirror those of the KDE Control Centre configuration for desktop sharing. If you simply want to show what your desktop is doing (and let somebody follow along), click the Allow other users to view your desktop check box. If you are looking for help, or you want to help the person on the other end, make sure the person sharing checks the Allow box, second from the top. Users who want to leave a sharing session open all the time may decide to check the Ask you for confirmation button, so that a remote user has to have their permission. Finally, if this is an unattended connection, you'll surely want to assign a password to allow this connection to happen. Although it may not seem apparent here, you also can generate an e-mail invitation by clicking the command listed under Users can view your desktop using this command.

To connect to a remote shared desktop, you can use any VNC client—the GNOME `vino-server` program suggests `vncviewer` as the command to use—including a Java-enabled browser. The invitation e-mail tells you how to do this. The slicker, desktop-oriented way to do this is by using the tools provided by your desktop environment. The KDE Remote Desktop Connection program (`Krdc`) can be started

from the Internet K Menu, where you'll see it listed as Remote Desktop Connection. From the dialog that pops up, you can enter the host connection information as shown in Figure 5.

The connection program can be used simply by entering the sharing host's address and pressing Connect. Another window appears asking you to specify the quality of your connection—whether it be a fast LAN connection, a slow dial-up connection or something in between. When you do connect, what happens depends on how the invitation was created. If the confirm option was set, a warning message appears on the remote desktop asking for confirmation. On the client side, you then may be asked for a password.

On the GNOME side of things, remote connections are done with the Terminal Server Client program (Figure 6). You'll find it under Applications in the Internet menu, but you also can run it directly with `tscClient`.

The Terminal Server Client has five tabs, the most important of which is the General tab. Enter the remote computer's address (including

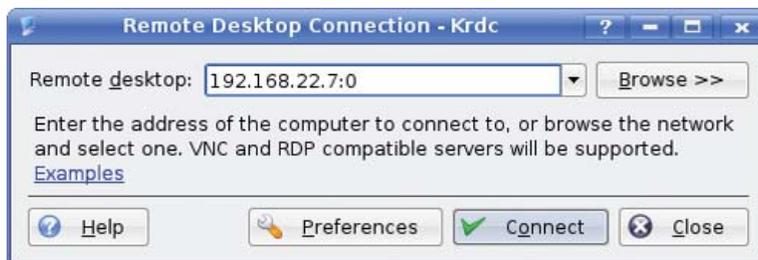
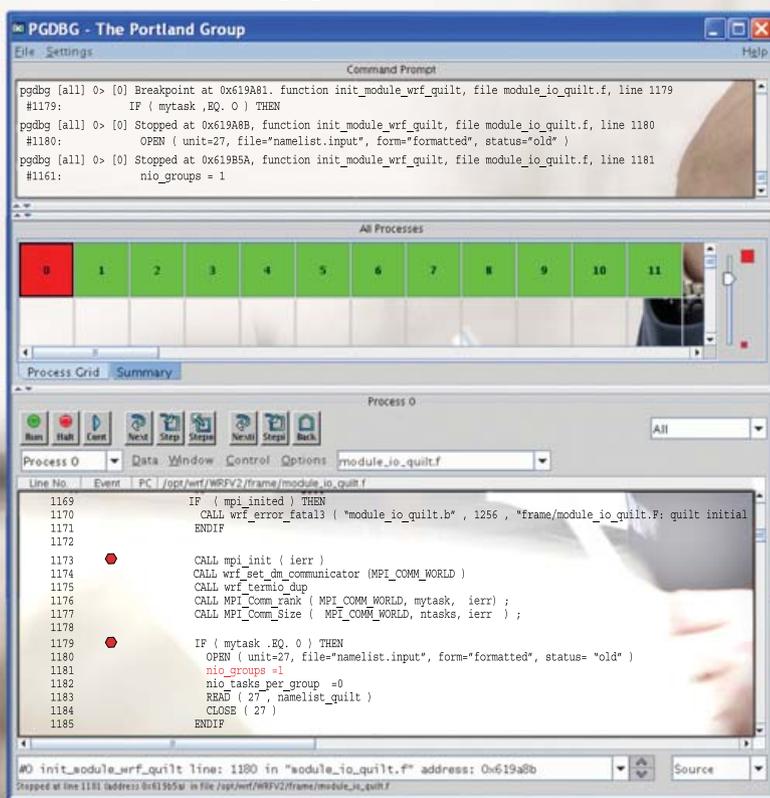


Figure 5. Connecting with the KDE remote connection program—note the :0 at the end of the address.

the :0 display extension as shown by the desktop sharing server program), and make sure you select VNC as the protocol from the drop-down list. For these remote desktop sessions, you simply can click Connect and be done. As with the KDE client, the remote user may need to confirm the session (which may require you to enter a password) and then manually give you control of the mouse and keyboard. The additional tabs allow you to define your display size, set color

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Note:

KDE client programs can connect to GNOME desktops and vice versa.



Figure 6. The GNOME Terminal Server Client Program

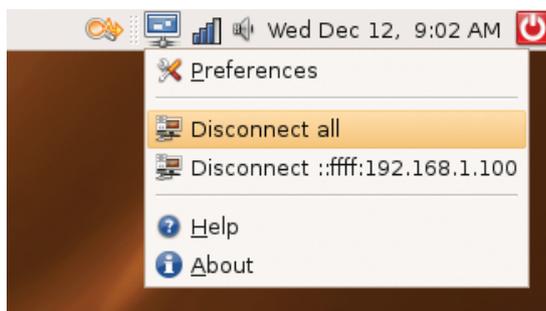


Figure 7. The GNOME Desktop Sharing Tray Icon with Drop-Down Menu

depth or modify some performance-related parameters. Incidentally, both the KDE remote client and the GNOME Terminal Server Client also let you connect to an RDP session as well.

Once a session is open, a tray icon appears in your system tray. The GNOME icon looks like a small terminal screen (Figure 7), and the default KDE tray icon (Figure 8) looks like a screen with a globe in front of it. In both cases, you can right-click on the tray icon where a drop-down or pop-up menu will show you active connections and give you a means to terminate them.

Once you have established a connection, the remote system becomes a window on your current desktop. You can switch to full-screen mode, or as is the case with the KDE client, you can drag the



Figure 8. The KDE desktop sharing system tray icon (top right next to the clock) lets you manage connections and desktop control.

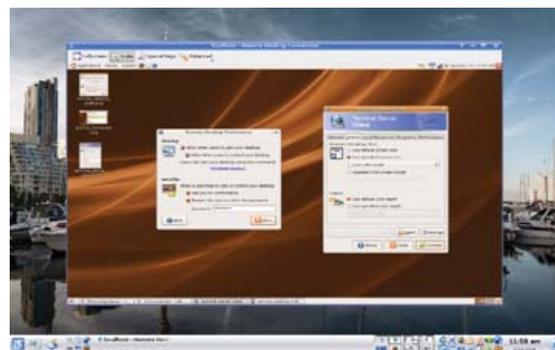


Figure 9. The KDE Krdc viewer lets you change the size of your remote session dynamically.

window to any size you desire, then click the Scale button to resize the remote control session dynamically (Figure 9).

Despite the many advantages of doing things at a distance, there is only one way to enjoy a glass of wine, and that is by being there. Luckily, François, our most excellent waiter, is not elsewhere, but right here in this restaurant. As the clock ticks ever closer to closing time, I'm sure we can convince him to let us enjoy a little more wine before we head to our respective homes. If you please, François, make sure everyone's glass is refilled. Raise your glasses, *mes amis*, and let us all drink to one another's health. *A votre santé! Bon appétit!* ■

Marcel Gagné is an award-winning writer living in Waterloo, Ontario. He is the author of the *Moving to Linux* series of books from Addison-Wesley. He also makes regular television appearances as Call for Help's Linux guy and every month on radio's Computer America show. Marcel is also a pilot, a past Top-40 disc jockey, writes science fiction and fantasy, and folds a mean Origami T-Rex. He can be reached via e-mail at mggagne@salmar.com. You can discover lots of other things (including great Wine links) from his Web site at www.marcelgagne.com.

Resources

Marcel's Web Site: www.marcelgagne.com

The WFTL-LUG, Marcel's Online Linux User Group:
www.marcelgagne.com/wftllugform.html

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DAVE TAYLOR

Understanding Shell Script Shorthand

Wherein we delve into the mysterious shell script authoring style of system scripts, deciphering common shorthand notations and exploring why they are a part of scripting. If you ever dig about in system scripts, you'll definitely want to read this column!

Oh happy day! I got an e-mail from a reader with a shell script question that didn't appear to be homework from a programming class or anything to do with hacking passwords. The reader wrote:

I am reading the scripts in the /etc/init.d directory. I am very new to such scripts and don't understand how they're written. In every script, there are statements like:

```
[ -x /usr/sbin/halt ] || exit 0
```

What is the meaning of this? Why is || used here?

Also, in the "stop" case of the halt daemon init script, there is this sentence:

```
[ $RETVAL -eq 0 ] && touch /var/lock/subsys/$name
```

I don't understand what these do. Can you explain?

With apologies to my old friend Larry Wall, this is what I call the "Perl syndrome" (though if we really want to go back in time, I saw this same problem with Algol-68 and PL/I, among

If you are missing that script, you have some serious problems, but a lot of system scripts are written this way.

others, and even worse in Ada)—obfuscated code because of the ability of programmers to abbreviate their code to make it shorter and, sometimes, more efficient.

Looking at the filesystem explains one of these structures. Check this out:

```
$ ls -l /bin/[]
```

```
-r-xr-xr-x 2 root wheel 46704 Sep 23 20:35 /bin/[*
```

```
$ ls -l /bin/test
```

```
-r-xr-xr-x 2 root wheel 46704 Sep 23 20:35 /bin/test*
```

It may seem odd, but there's actually a file in the /bin directory in Linux that is called [], and it's synonymous with the test utility. You can learn about it by typing `man test` in a terminal window, but it's actually more complicated than that, because modern shells (such as Bash) have test built in to the shell code itself for performance reasons. So, there are actually three different versions of test.

If you do opt to use the [] version, the program requires that you have a matching] for syntactic cleanliness (e-hygiene?). If you omit it, you'll get `-bash: [: missing `']` as an error.

So, that first statement, `[-x /usr/sbin/halt] || exit 0`, can be unwrapped initially as a test, and a quick glance at `man test` reveals that the `-x` test is for checking whether the named file exists and is executable. Basically, this statement ensures that there's a /usr/sbin/halt script before it executes it to avoid any errors. This is a portability test. If you are missing that script, you have some serious problems, but a lot of system scripts are written this way.

Now, on to the || notation. Along with its partner &&, these two notations cause a lot of confusion for people delving into scripts, so let's start by reading what the Bash man page says about them (`man bash`):

```
command1 && command2
```

command2 is executed if, and only if, command1 returns an exit status of zero.

```
command1 || command2
```

command2 is executed if and only if command1 returns a non-zero exit status.

The return status of AND and OR lists is the exit status of the last command executed in the list.

Clear as mud, right? This will become more clear when we go back to the test man page and find out that “The test utility exits with one of the following values: 0 = expression evaluated to true, 1 = expression evaluated to false or expression was missing.”

So, the logic here is that the `[]` test is performed to see whether the script exists and is executable, and if it fails, the `exit 0` is performed. How do you know if it fails? The test statement would return an exit value of 1.

Now, let’s look at the second statement with this in mind. You asked about this statement:

```
[ $RETVAL -eq 0 ] && touch /var/lock/subsys/$sname
```

Again, the `[]` is a shorthand notation for the test application. `RETVAL` is a system variable, and the `-eq` is a numeric test for equality. In this case, the return value again determines whether the test is true or false. If it’s true (a zero return value), the `touch` command is used to set what’s called a semaphore—a lock file to indicate to other scripts that the `$sname` subsystem is locked up and unavailable to modify.

This is actually a pretty sloppy way to set a semaphore because it’s not atomic. There is a distinct likelihood that in the interim between the first `RETVAL` test and the `touch` command, the script will be swapped out for a few milliseconds and another script run. This means that two scripts possibly could both believe they’ve locked the file—something called a race condition in computer science theory, and something that is obviously not a good thing.

Anyway, I’m not supposed to be debugging system scripts. So, suffice it to say that the purpose of the statement is to test the return value of a previous command (there’s probably a statement like `RETVAL=$?` on the previous line, as `$?` is shorthand for the return value of the previous shell command). If the test is true, the temporary file is “touched” (that is, it’s created and given a creation timestamp of the current date and time).

Later in the script, there is undoubtedly a statement like `rm -f /var/lock/subsys/$sname`, and in fact, a cleaner way to write it would be to trap exit conditions and make sure that the lock file isn’t left around, even if the script errors out. This is done with the trap shell command. Error condition 0 is a standard termination, so one clean way to write this is as follows:

```
trap "/bin/rm -f /var/lock/subsys/$sname" 0
```

This provides a lot of flexibility, because you can capture any of the dozens of possible signals like `SIGINT` (interrupt) or

This means that two scripts possibly could both believe they’ve locked the file—something called a race condition in computer science theory, and something that is obviously not a good thing.

`SIGHUP` (hangup).

Anyway, you’re not the first to be baffled by system scripts, but as you can see, a bit of persistence reveals all. ■

Dave Taylor is a 26-year veteran of UNIX, creator of The Elm Mail System, and most recently author of both the best-selling *Wicked Cool Shell Scripts* and *Teach Yourself Unix in 24 Hours*, among his 16 technical books. His main Web site is at www.intuitive.com, and he also offers up tech support at AskDaveTaylor.com.

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MICK BAUER

Security Features in Ubuntu

Securing Ubuntu is as straightforward as installing it.

For a couple years, I resisted my friends' attempts to get me to check out Ubuntu. I thought, "What's the big deal? It's just another Debian derivative." But, of course, I was wrong. Ubuntu is remarkably easy to install and use, and although it is indeed based on Debian, its emphasis on usability and simplicity sets it apart.

Furthermore, both the Desktop and Server editions of Ubuntu use dual-purpose live CDs that can be used either to install Ubuntu or run it from CD without affecting any other operating systems on your hard disk. This makes it easy to test-drive Ubuntu before installing it to your hard disk. (The live CD method of booting Linux has important, useful security ramifications; however, that will be the topic of an entire future column.)

So, I have been messing around with Ubuntu quite a bit lately and thought you might enjoy a survey of its security capabilities.

First, a quick note about the scope of this article—I'm sticking to Ubuntu Desktop; space doesn't permit me to include Ubuntu Server, but I might cover it in a future column. Suffice it to say for now that Ubuntu Server is a subset of Ubuntu Desktop, lacking the X Window System and most other non-server-related software.

I also do not explicitly cover Kubuntu, which simply is Ubuntu running the KDE desktop rather than GNOME; Edubuntu, which emphasizes educational applications; or Xubuntu, which is Ubuntu with the Xfce desktop. Everything I cover in this article should apply to these Ubuntu variants, but there may be subtle differences here and there.

Note also that Gobuntu, an experimental subset of Ubuntu consisting only of completely free/unencumbered software packages, probably has considerably fewer security features and packages than Ubuntu proper.

Ubuntu vs. Debian

Ubuntu security isn't very far removed from Debian security; underneath the GUI, Ubuntu is very similar to Debian. In this sense, Ubuntu shares all of Debian's security *potential*, and then some. If a given security tool is available as a deb package that works correctly in the current version of Debian, it also can be installed in the current version of Ubuntu.

So, why dedicate an entire article to Ubuntu security? Two reasons. First, because it has been more than a year since my last article on Debian security. Second, Ubuntu has a few key differences from standard Debian: its status as a live CD distribution (which among other things makes it a good choice for running on untrusted hardware) and its ease of use, which on the one hand, doesn't yet much apply to Ubuntu's security features, but it does make Ubuntu more attractive to non-expert users than Debian proper, amplify the ramifications of Ubuntu security. Ubuntu also uses AppArmor, a powerful means of restricting daemon behavior.

Software is the key difference between Debian and Ubuntu. I've long been of the opinion that Debian's staggering array of software packages is also one of its biggest challenges. Figuring out which of those thousands of packages you need can be confusing even for expert users. A key design goal of Ubuntu is, therefore, to support a smaller, carefully selected subset of Debian's packages.

Ubuntu, however, doesn't merely rebundle standard Debian packages. Ubuntu maintains its own versions, and according to Wikipedia, in many cases, Debian and Ubuntu packages aren't even binary-compatible. (The Ubuntu team has pledged to keep Ubuntu compatible with Debian by sharing all changes it makes to Debian packages, but the Debian team has grumbled about Ubuntu's team not being prompt enough in doing so.)

The biggest source of confusion I've experienced with Ubuntu personally is that Ubuntu uses a different package repository schema than Debian, and Ubuntu's own Web pages aren't terribly clear as to how it works. But, it's actually straightforward.

The main repository consists of fully supported, free (unencumbered) packages that are maintained by the Ubuntu team, the core of which is employees of Canonical Ltd. The main repository, therefore, is the heart of Ubuntu.

The restricted repository consists of nonfree (copyrighted) packages that are nonetheless fully supported and maintained, due to their critical nature. The majority of these packages are commercial hardware drivers that lack open-source equivalents.

The universe repository contains free software packages that are not considered part of Ubuntu's core, and therefore, they are not fully supported. The Ubuntu team takes no responsibility for security patches for these packages; unlike those in the main repository, security patches for universe are issued only when the software's developers issue them.

The multiverse repository contains commercial or otherwise IP-encumbered packages that are not part of Ubuntu's core, and it has the least amount of support from the Ubuntu team. As with universe, multiverse security updates are purely opportunistic.

In all four repositories, the vast majority of Ubuntu packages correspond with Debian packages. But, again, because all Ubuntu packages are maintained separately, don't assume it's safe to install a package from the universe or multiverse repositories just because it's fully supported in Debian. The Ubuntu team is committed to providing prompt security patches only for the main and restricted repositories.

In my opinion, this is a perfectly justifiable trade-off, just as it is in RHEL and CentOS—the fewer packages a distribution supports, the greater the feasibility of supporting them *well*, and the lesser the complexity of the distribution. High complexity and effective security seldom go together. However, the fact that you can't rely on timely security updates for universe and multiverse packages also means that Ubuntu may not be the best choice for you if you're going to depend heavily on packages from those repositories.

Ubuntu Installation

Now that I've explained how Ubuntu's repositories are structured, I can describe how to use them. Obviously, there's a lot more to system security than installing or not installing software. But, software is one of the biggest, if not the biggest, differentiators between Linux distributions, so it's a logical place to start.

One interesting thing about the Ubuntu Desktop installer is that at initial setup/installation, it doesn't ask you which software packages to install. It installs a static set of applications, and subsequently you can only add to or remove from it. Nor does the Ubuntu Desktop installer configure firewall rules or allow you to set any other security parameters, beyond creating the first nonroot user account.

Clearly, this installer emphasizes simplicity and speed. Luckily, Ubuntu is configured with reasonably good security by default.

The Rootless Ubuntu Experience

For example, it isn't possible to log in as root. Instead, you log in using an account with administrative

privileges, such as that initial account the installer creates for you, then you use the `sudo` command to execute individual commands as root. (You can use the Users and Groups applet in the System→Administration menu to grant or revoke administrative privileges to users.)

Using `sudo` prompts you for your *own* password (the root account on Ubuntu doesn't even have a password!), and then executes the given command. Graphical programs in Ubuntu automatically use `sudo` and prompt you for your password as needed.

Using `sudo` provides granular control over who can execute what privileged commands. It also logs all commands it executes. Having the root account present but essentially disabled also makes it somewhat more difficult for hostile code to gain root access. In short, I heartily approve of this design decision in Ubuntu. For more information, take a look at the Ubuntu RootSudo page (see Resources).

Installing Optional Software

Once you've installed Ubuntu, you can install additional software packages as needed, using the Install and Remove Applications applet (Add/Remove... in the Applications menu) or the Synaptic Package Manager (in the System menu under Administration). Figure 1 shows the Install and Remove Applications applet.

This applet is very simple to use, and it comes preconfigured with a set of Ubuntu repositories on the Internet. If you want to install packages from universe or multiverse, you need to enable this under Preferences. By default, only packages from main and restricted are shown.



Figure 1. Install and Remove Applications Applet (aka Add/Remove Applications)

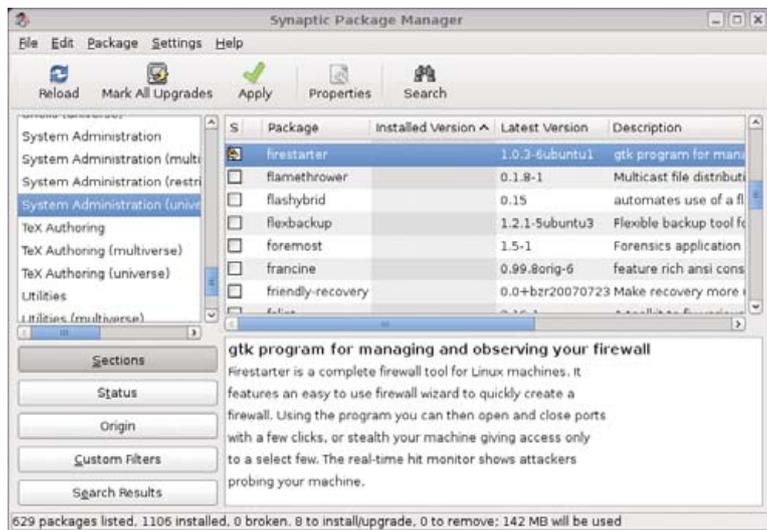


Figure 2. The Synaptic Package Manager

Personally, I prefer the Synaptic Package Manager (Figure 2). It handles dependencies more gracefully and offers more options for filtering and listing packages. It also lists raw packages (all the individual deb packages that make up an application), whereas the Add/Remove Applications applet lists packages only by application name (which isn't as precise). If installing an application involves four separate component packages plus seven

dependencies, I want to know it.

Note that both the Add/Remove Applications applet and the Synaptic Package Manager use the Software Source applet to obtain current lists of available packages. You need to know this, because by default, neither the universe nor multiverse repositories are enabled, and the Software Sources applet is where you enable them. In the Ubuntu desktop's System menu, open the Administration submenu to find the Software Sources applet. If you make changes in this applet, you'll be prompted to download fresh package lists before quitting.

Before I discuss actual packages, here's one more note about obtaining them: besides the Ubuntu repositories on the Internet, you also can install packages from the Ubuntu Desktop 7.10 CD. However, beyond the packages installed automatically, this CD contains only 29 additional packages from main and three from restricted. Therefore, in practice, you'll have to download most of the software you install after the initial system installation.

Notable Ubuntu Packages

Ubuntu Desktop 7.10 automatically installs with a number of important security-related software packages. Table 1 lists some of my favorites.

I've mixed security-auditing tools (fping and tcpdump) alongside defense tools (gnupg, SELinux and TCP Wrappers). Obviously, you need to give some thought as to whether a given system is going to have an "offensive" role versus a "defensive" role with respect to security; security scanners can be dangerous!

The main repository contains a wealth of additional security software packages. Table 2 lists more of my favorites.

But wait, there's more! We've actually scratched only the surface. The universe and multiverse repositories contain many, many more security software packages. Table 3 lists a very small subset of these. Remember, the Ubuntu team offers no guarantee of timely security patches for these packages.

As you can see, Ubuntu Desktop is an extremely versatile distribution. It contains a wide variety of security tools, representing many different ways to secure your system (and the network on which it resides).

Automatic Updates in Ubuntu Desktop

Once you've installed a bunch of software, keeping it patched is easy. To configure automatic updates, run the Software Sources applet, and select the Updates tab (Figure 3). These settings determine the behavior of the Update Manager applet.

The Update Manager applet runs automatically

Table 1. Security-Related Packages Installed by Default

Package Name	Description
apparmor, apparmor-utils	Novell AppArmor, type-enforcement controls for selected applications.
fping (!)	Flood Ping, for probing ranges of IP addresses.
gnupg	GNU Privacy Guard, a free OpenPGP implementation.
libselinux1, libsepol1	SELinux libraries (require user-space tools from the universe repository).
libwrap0, tcpd	TCP Wrappers, simple IP filtering for daemons.
netcat	Netcat, a general-purpose port-forwarder.
openssh-client	A free SSH client. Note that ssh-server isn't installed by default.
tcpdump	Classic protocol analyzer (sniffer).
update-manager	GUI-based tool for automatic notifications and installing software updates.
wpa_supplicant	WPA client for 802.11 wireless networks.

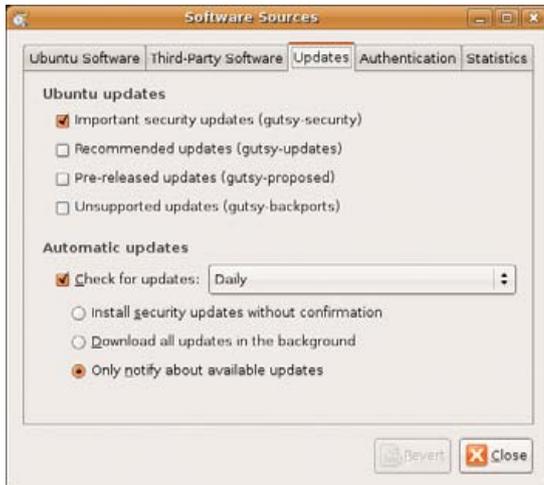


Figure 3. Setting Up Automatic Updates in Ubuntu Desktop

in the background, but you also can start it manually from the System menu in the Administration section. You can configure it (from Software Sources) to do any of the following: 1) notify you of updates, 2) download patches automatically and notify you when they're ready for installation, or 3) download and install patches automatically.

Novell AppArmor in Ubuntu

Remember back in my August 2006 article "An Introduction to Novell AppArmor", when I commented that despite its SUSE roots, AppArmor probably would be ported to other distributions soon? (No? Well, I did say that—you can look it up!) Sure enough, not only does Ubuntu have a port of AppArmor, but it's also installed and enabled by default.

If you're unfamiliar with it, AppArmor is an

Table 2. More Security Packages in the Ubuntu Main Repository

Package Name	Description
aide	Integrity checker similar to Tripwire.
auth-config-client	PAM (Pluggable Authentication Module) configurator.
checksecurity	cron jobs for security checking.
chkrootkit	Rootkit detection toolkit (though this is best run from read-only media).
cryptsetup	Tool for creating encrypted filesystems.
dovecot-imapd, dovecot-pop3d	Secure IMAP and POP3 daemons.
exim4-daemon-heavy	SMTP daemon with extended features.
gpgsm	GnuPG for S/MIME.
ipsec-tools	User-space tools for configuring IPsec tunnels.
kwalletmanager	Password vault for KDE.
libkrb53, krb5-doc	Kerberos runtime libraries.
logcheck	Scans log files for anomalies and sends admin e-mail notifications.
nessus, nessusd	Nessus security scanner.
opie-client, opie-server, libpam-opie	OPIE one-time password system (based on S/KEY).
shorewall	System for generating iptables firewall rules.
slapd	OpenLDAP server daemon.
squid, squid-common	Web proxy with caching and security features.
vsftpd	The Very Secure FTP Daemon.

Table 3. Security Software in the Universe and Multiverse Repositories

Package Name	Repository	Description
aircrack-ng	universe	WEP/WPA wireless network shared-secret auditor.
amavisd-new	universe	Antivirus/spam-filter helper daemon.
avscan	universe	GUI for ClamAV antivirus system.
bastille	universe	Comprehensive system-hardening scripts.
chntpw	multiverse	Changes passwords on Windows NT/2K/XP systems.
clamav	universe	ClamAV, a free virus scanner.
djbdns-installer	multiverse	Secure domain name service daemon.
firestarter	universe	An iptables GUI (GNOME).
flawfinder	universe	Source code security analyzer.
freeradius	universe	RADIUS server for remote access and WLAN/WPA authentication.
perdition	universe	An IMAP4/POP3 proxy.
spikeproxy	universe	Web client proxy for Web site probing/analysis.
tiger	universe	Security audit scripts.
tripwire	universe	The classic file/directory integrity checker.
uml-utilities	universe	User Mode Linux virtualization engine tools.
wireshark	universe	Graphical network packet sniffer/analyzer.
zorp	universe	Application-layer proxy firewall.

What this means in English is that AppArmor lets you restrict the activities of system daemons—what files they can read, which directories they can access, which devices they can write to or read from and so on.

implementation of Type Enforcement, a type of Mandatory Access Control. What this means in English is that AppArmor lets you restrict the activities of system daemons—what files they can read, which directories they can access, which devices they can write to or read from and so on. It is a powerful means of containing the effects if a protected daemon is compromised—even if attackers succeed in hijacking a given process, they can't use it to execute arbitrary commands, read arbitrary files and so forth.

Perhaps surprisingly, given Ubuntu's very slick look and feel, AppArmor is configurable in Ubuntu only via the command line, using the aa tools (aa-status, aa-genprof and so on) in the apparmor-utils package. Visit the Ubuntu AppArmor page for more information (see Resources).

Managing Users and Groups

In the root/sudo discussion above, I mentioned the Users and Groups applet. This applet is deceptively simple to use. It's actually one of the more sophisticated front ends to adduser, addgroup and so on

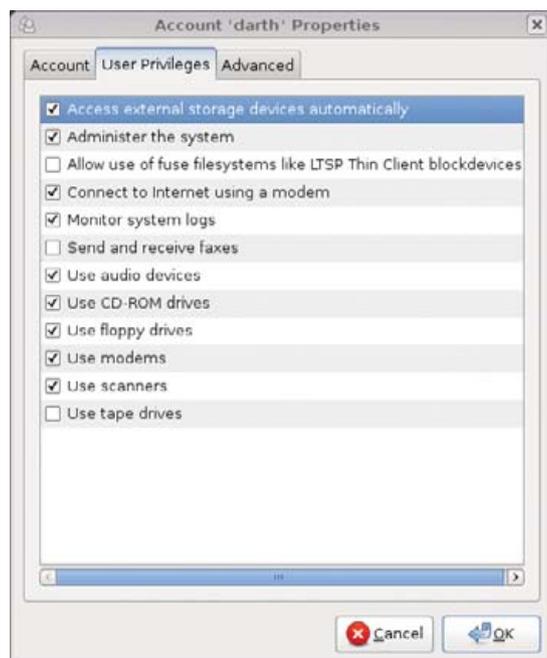


Figure 4. Setting User Privileges in Ubuntu

that I've seen. If you select a user, click Properties, and click the User Privileges tab, you can not only grant that user the right to "Administer the system" (that is, to execute commands as root using sudo), you also can select from a long list of other system privileges (Figure 4).

If you're an old-school sysadmin like me, you know that none of these privileges are handled directly by tools like adduser; the settings in this part of the applet simply determine to which groups the user belongs—groups that the Ubuntu team carefully has configured to correspond with real-world system administration-related commands and objects. This is a clever and simple way to manage administrative functions, especially in combination with sudo.

Conclusion

As you can see, Ubuntu's ease of use doesn't come at the cost of security—it has Debian's abundance of security-related software packages combined with straightforward but effective security design decisions, such as disabled root and AppArmor, and easy update management. ■

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Resources

Official Ubuntu Home Page: www.ubuntu.com

Ubuntu RootSudo Page, describing Ubuntu's sudo implementation in detail: <https://help.ubuntu.com/community/RootSudo>

"Keeping Your Computer Safe"—simple security tips from Ubuntu 7.10's official documentation: <https://help.ubuntu.com/7.10/keeping-safe/C/index.html>

Security Pages in the Ubuntu User Community's Wiki: <https://help.ubuntu.com/community/Security>

AppArmor Page in the Ubuntu User Community's Wiki: <https://help.ubuntu.com/community/AppArmor>

The "Securing Debian Manual", indirectly applicable to Ubuntu: www.debian.org/doc/manuals/securing-debian-howto/index.en.html

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KYLE RANKIN

Automate your Desktop with wmctrl

Why move, resize and shade windows by hand when a program can do it for you?

Okay, I'll admit it; I'm addicted to automation. A Roomba vacuums for me, my main router checks its DSL connection and automatically resets my DSL modem if it's down, my porch light is motion-sensitive, and my bin directories are full of homegrown scripts I use to automate mundane computer tasks. There is something so satisfying when you can reduce a long series of steps down to a single script and just run that script.

When most people think of automation with scripts, they think about the command line. After all, most scripts are concerned with standard command-line fare, such as pipes, simple logic, redirection and parsing text output. These days, much of the work on the desktop is done without a terminal, so it would be nice if you could automate some of those more mundane graphical tasks too. A tool called `wmctrl` can do exactly that. `wmctrl` provides a command-line interface to standard window management tasks, so you

These days, much of the work on the desktop is done without a terminal, so it would be nice if you could automate some of those more mundane graphical tasks too.

can resize and move windows, change desktops, toggle sticky and rolled-up statuses on a window and much more, all from a shell script.

`wmctrl` is a common package in most modern distributions, so you should be able to install it with your distribution's package manager. Otherwise, you can obtain the source from `wmctrl`'s main Web site (www.sweb.cz/tripie/utils/wmctrl) and build it. One of the great things about `wmctrl` is that it isn't window-manager-specific. It changes your windows via Extended Window Manager Hints (EWMH), and because most of the popular window managers these days (such as GNOME's Metacity, KDE's KWin, Compiz Fusion and Fluxbox) support EWMH, not only will `wmctrl` likely work with your window manager, but also

if you decide to change to a different window manager, your `wmctrl` scripts probably will work just the same.

Quake Terminal

One of the best ways to illustrate the power of `wmctrl` is to create a script that turns a regular terminal into a Quake terminal. For those of you who haven't played any games from the *Quake* series, when you press the ``` key in *Quake*, a terminal pops down from the top of the screen so you can type commands. This type of terminal is very handy on a cluttered desktop, but you even could use this to create a type of "boss button" to make a window disappear quickly.

In this example, I create a terminal that I've titled "Quake Term", but you can change this script to work with the title of any window on your desktop. If you are unsure how `wmctrl` will view your window's title, run `wmctrl` with the `-l` option to show information about all the windows on your desktop:

```
greenfly@minimus:~$ wmctrl -l
0x020000ba 0 minimus Quake Term
0x00e00031 -1 minimus Desktop
0x01200003 -1 minimus gkrellm
0x00800029 -1 minimus Top Expanded Edge Panel
0x00800003 -1 minimus Bottom Expanded Edge Panel
0x01000172 0 minimus greenfly.org - Mozilla Firefox
```

The very last field in this output is the title of a particular window, and this is the information `wmctrl` can use to identify windows for which you want to script actions. To create a basic Quake Term, you just need a single `wmctrl` command:

```
#!/bin/sh

wmctrl -r 'Quake Term' -b toggle,shaded
```

The `-r` option tells `wmctrl` the window title on which to act, and the `-b` option tells `wmctrl` either to add, remove or toggle up to two different window properties (in this case, the shaded state of my window). The `wmctrl` man page lists all

the available properties you can tweak with this and any other options.

Note that `wmctrl` scripts work best if windows have unique titles. If you have multiple windows open with the same title, you might not shade the right one. Each terminal sets its title differently, but for instance, on a GNOME terminal, you can change the title within your profile settings (right-click on the terminal and select Edit Current Profile).

I use a modified version of the above command that not only shades the window, but also moves it to the back below any other windows. The script also keeps track of the toggled state with a temporary file so that I can be sure the shaded and stacked states stay in sync:

```
#!/bin/sh

# Unshade and bring to front
if [ -f /tmp/.quake.shaded ]; then
    wmctrl -r 'Quake Term' -b remove,below
    wmctrl -r 'Quake Term' -b remove,shaded
    rm /tmp/.quake.shaded
# Shade and send to back
else
```

One of the great things about `wmctrl` is that it isn't window-manager-specific.

```
wmctrl -r 'Quake Term' -b add,shaded
wmctrl -r 'Quake Term' -b add,below
touch /tmp/.quake.shaded
fi
```

I simply bind `Super-`` to run the above script, and then I can toggle my terminal up and down with a quick key sequence.

Quake terminals are handy, but you can do much more powerful things with `wmctrl`. One of the most handy scripts I've created with `wmctrl` solves a problem I've had when I chat in IRC and browse the Web at the same time—it's a pain to resize both windows so you can see both, just to resize them back when you are done chatting or browsing. `wmctrl` lets you resize and move windows, provided you know how to describe the new window location and geometry. With this in mind, I've created a script that toggles between two states: normal mode and chat mode. In chat

Expert included.

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In chat mode, my IRC window shrinks and moves so that it sits in a narrow strip at the top of the screen, and my Web browser resizes to be shorter so I can see both windows at the same time.

mode, my IRC window shrinks and moves so that it sits in a narrow strip at the top of the screen, and my Web browser resizes to be shorter so I can see both windows at the same time. Then, I can run the script again, and the windows move back to their normal locations.

To create the script, first arrange your two windows (in my example, one with “Irssi Term” in the title and one with “Firefox” in the title) how you normally want them, and then run a special `wmctrl` command to list all the windows on your desktop along with their geometry and size information:

```
greenfly@minimus:~$ wmctrl -lG
0x00e00031 -1 0 48 1280 768 minimus Desktop
0x01200003 -1 -130 100 62 367 minimus gkrellm
0x00800029 -1 0 0 1280 24 minimus Top Expanded Edge Panel
0x00800003 -1 0 1524 1280 25 minimus Bottom Expanded Edge Panel
0x01000172 0 6 96 1040 708 minimus greenfly.org - Mozilla Firefox
0x0201c24f 0 -2552 96 642 410 minimus Eterm Main 1
0x02000021 0 -2552 96 642 410 minimus Eterm Main 1
0x020000ba 0 938 96 810 500 minimus Irssi Term
```

In this output, the `-G` option adds four extra columns in the middle. These columns represent the x-offset, y-offset, width and height, respectively. So, in the case of Firefox, the x-offset is 6, the y-offset is 96, the width is 1040, and the height is 708. Jot down these values for the two windows you want to script, and then resize and move them to reflect your “chat mode”. Next, run the command again and jot down the new values.

`wmctrl` provides the `-e` argument that allows you to modify the position and size of a window. The argument actually takes five integer values in a row—`g,x,y,w,h`—where `g` is the gravity of the window (usually put 0 here), `x` and `y` are the `x` and `y` coordinates for the top-left corner of the window, and `w` and `h` are the width and height, respectively. So, if I had moved my Firefox terminal and wanted to move it back to the above coordinates, I would run the following:

```
wmctrl -r Firefox -e '0.6,0,1040,708'
```

If you look carefully, you might notice I changed

the `y` coordinate to 0 instead of 96. I’ve found that in some window managers, the geometry the window manager reports to `wmctrl` is different from reality. Basically, you need to do a little trial and error and tweak the coordinates so that everything lines up just right. Once you are satisfied with your respective `wmctrl` commands, you can throw them in a script very similar to the one I used above for the Quake terminal:

```
#!/bin/sh

# Change to normal mode
if [ -f /tmp/.irssi.halfshaded ]; then
    wmctrl -r 'Irssi Term' -e '0,469,0,810,500'
    wmctrl -r Firefox -e '0,3,0,1040,708'
    rm /tmp/.irssi.halfshaded

# Change to chat mode
else
    wmctrl -r Firefox -e '0,3,223,1210,535'
    wmctrl -r 'Irssi Term' -e '0,0,0,1214,160'
    touch /tmp/.irssi.halfshaded
fi
```

I noticed that with the current window manager (Compiz), when I ran this command, some bug—either in `wmctrl` or, more likely, in the window manager—caused Firefox to move from my second desktop to my current desktop. If this happens to you, there’s a simple fix. Simply add the following line above the `if` statement in the script:

```
wmctrl -o 1281,0
```

`wmctrl` has commands both for shifting to different desktops and also to different viewpoints. Because Compiz often uses multiple viewpoints instead of desktops, the above command moves me to the second viewpoint (my desktops are 1280x768, so 1281,0 corresponds to the top corner of my second viewpoint).

`wmctrl` has a lot of power. I recommend looking at its man page and reading about the large number of available options. The real power in `wmctrl`, however, lies in your ability to imagine new and interesting ways to script window manager actions. My next project is to create a “reset” script that moves all the windows on all my desktops to precise locations and sizes, in case they all are moved around and resized. Sure, I could do all that by hand, but then I’d miss this great opportunity for automation. ■

Kyle Rankin is a Senior Systems Administrator in the San Francisco Bay Area and the author of a number of books, including *Knoppix Hacks* and *Ubuntu Hacks* for O’Reilly Media. He is currently the president of the North Bay Linux Users’ Group.



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Computer Professionals' Union Karapatan-Monitor

Here's some irony for you. On one hand, Google stifles human rights by censoring Google China for the authoritarian Chinese regime. At the same time, Google Code hosts an antidote, a new human-rights monitoring program, called Karapatan-Monitor. Created and maintained by the Computer Professionals' Union in the Philippines, the open-source Karapatan-Monitor records incidents of human-rights violations and allows for classification of violations, perpetrators and victim status. Specific victim updates (for example, court cases and file attachments) also can be recorded. Now, the question remains, "Dear Google, can those who need Karapatan-Monitor most, such as our Chinese brothers and sisters, even access it?"

www.cp-union.org



Avinti's NEWT Free Malware Security Service



The battle of good vs. evil continues, with the good guys adding a sharp new arrow to the quiver: Avinti's NEWT Free Malware Security Service. Fresh out of beta, NEWT (Neutralize E-mail and Web Threats) is a freeware plugin filter for Sendmail, Postfix and (soon) Exim that addresses blended threat attacks. Avinti reported an average of 750 new threat e-mail messages per day in late 2007. The company emphasizes that "blended threats are an increasingly popular way for hackers to bypass traditional e-mail security" by sending URLs hosted on botnet-infected computers. In addition, "some of the malware also is on legitimate sites that have been injected with a cross-site scripting hack, making detection and blocking by Web filters difficult." NEWT can block, tag or quarantine e-mail messages containing such threats. NEWT is available for free download from Avinti's Web site.

www.avinti.com/newt

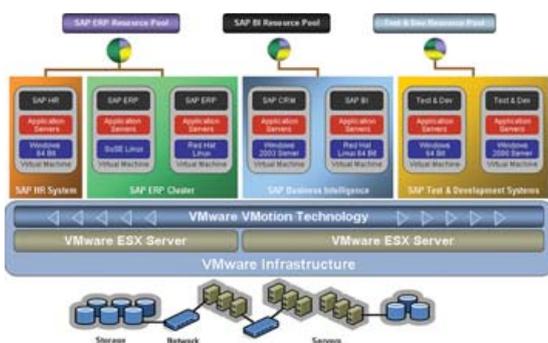
WaveMaker's Visual Assembly Studio & Rapid Deployment Framework

WaveMaker has declared Visual Assembly Studio & Rapid Deployment Framework, a new team of products for developing Web applications, as "Web Fast and CIO Safe". (Do you breathe fire, as well, dear CIO?) Visual Assembly Studio provides departmental developers with a visual environment to create scalable, data-driven Web applications without complex code or portal frameworks. Meanwhile, Visual Assembly Studio enables the drag-and-drop assembly of Web applications using Ajax widgets, Web services and databases. WaveMaker claims a 67% decrease in development time and a 98% reduction in lines of code written vis-à-vis .NET. Both products are built on open source and open standards. Visual Assembly Studio is free, and the Rapid Deployment Framework is available under commercial license.

www.wavemaker.com

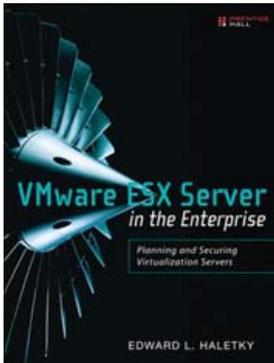


VMware's ESX Server in SAP Production Environments



VMware, Inc., and SAP AG recently announced a partnership whereby SAP's 64-bit enterprise applications and business solutions (such as ERP, BI, CRM, SCM and so on) for Linux and Windows will run on VMware's ESX Server. Already-certified hardware includes servers from Dell, Fujitsu-Siemens, HP, IBM and Sun. Both firms will collaborate on support services and problem resolution arising from the partnership. The companies state that the partnership will "combine the powerful process management capabilities of SAP solutions with the robust data-center management and cost-saving features of VMware infrastructure." The results are projected to provide improved management of IT resources, reduced downtime, reduced server sprawl and quick-and-easy server provisioning.

www.vmware.com/SAP



Edward L. Haletky's *VMware ESX Server in the Enterprise: Planning and Securing Virtualization Servers* (Prentice-Hall)

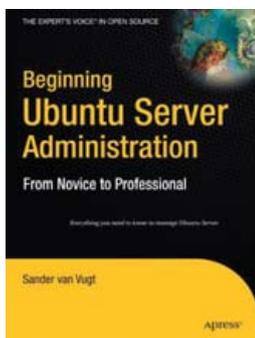
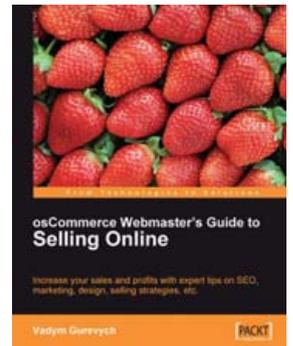
If you take advantage of the SAP-VMware deal (see page 40), here's a strategically placed impulse buy: Edward L. Haletky's *VMware ESX Server in the Enterprise: Planning and Securing Virtualization Servers*, published by Prentice-Hall. Author Haletky, an expert in large-scale ESX Server implementations, has gathered a practical, solutions-focused collection of information on the application—tips, best practices, field-tested solutions, issues, trade-offs and pitfalls. He also covers the entire life cycle, including planning, installation, system monitoring, tuning, clustering, security, disaster recovery and so on. Focusing on ESX v3.x, the book also illustrates differences with ESX v2.5.

www.informit.com

Vadym Gurevych's *osCommerce Webmaster's Guide to Selling Online* (Packt)

Nowadays, finding a professionally produced guide to an open-source application is a snap, thanks in part to nimble book publishers like Packt Publishing. Packt just released Vadym Gurevych's *osCommerce Webmaster's Guide to Selling Online*, a guide to creating a successful osCommerce-based on-line business. osCommerce is an open-source e-commerce solution using PHP and MySQL that runs on a variety of platforms. This book focuses on fine-tuning an osCommerce-based site to maximize its effectiveness, such as increasing Google juice and improving shopping-cart design. Meanwhile, Packt offers a different book, *Deep Inside osCommerce: The Cookbook*, for the development side of the application.

www.packtpub.com



Sander van Vugt's *Beginning Ubuntu Server Administration: From Novice to Professional* (Apress)

Do you think that Ubuntu Server will take over the Linux server space as it has the desktop? Apress has a new means for you to decide for yourself in Sander van Vugt's *Beginning Ubuntu Server Administration: From Novice to Professional*. Intended for system administrators who need to "land that crucial entry-level job", *Beginning Ubuntu* will help you securely install, update and deploy an Ubuntu server, focusing on practical information rather than theory. The book covers standard servers, the command line and remote management.

www.apress.com

OpenPeak's OpenFrame Devices

In-home device convergence has long been the Holy Grail for many a company. Remember WebTV? (Stop giggling, please, we must proceed!) A new and compelling Grail-seeker is OpenPeak with its forthcoming OpenFrame line of devices. Although details remain sketchy pre-Consumer Electronics Show, we do know that the goal is to create a line of Linux-based devices that "revolutionize the home phone into a 'third screen', complementing the home's PC, TVs and mobile phones." These devices will utilize telephony, VoIP and Internet, thus allowing users to access e-mail, voice mail, personal calendars and information, as well as leave memos for family members and make phone calls—all from one device. The good news for us is that OpenPeak is seeking outside developers to create applications for its software platform. All products will be available through OEM partners, the first of which is Verizon.

www.openpeak.com



Please send information about releases of Linux-related products to James Gray at newproducts@linuxjournal.com or New Products c/o *Linux Journal*, 1752 NW Market Street, #200, Seattle, WA 98107. Submissions are edited for length and content.

HARDWARE

ASUS Eee PC

An easy-to-love, ultraportable PC. JES HALL

The **ASUS Eee PC** is an extremely small, ultraportable notebook at the cheapest end of the market. At \$399 US, it's supremely affordable. The entire industry has been buzzing around it, with Asus claiming that it was America's most popular Christmas gift.

When we arrived at the store to pick up our Eee to review, all the salespeople were busy. We looked near the laptops for it and couldn't see it—had the shipment been delayed?

We finally snared a salesperson to ask about the Eee and were led to the small electronics cabinet. There, nestled among the compact cameras and iPods, was one of the smallest laptops we'd ever seen. Its box was also diminutive. Inside the box is the Eee, manuals, CD, charger, neoprene sleeve and the Eee's battery. We appreciated the inclusion of the sleeve—most notebook bag and case makers have nothing for a machine this small.

First Impressions

Aesthetically, the Eee looks like exactly what it is—a miniature laptop. Ours came in pearl white. It drew comments

and admiring glances everywhere we took it—for both its extremely small size and smooth styling. The only aspect that mars its appearance is a large screen bezel. We feel the Eee would be vastly improved cosmetically if the screen filled even half that bezel. But, that's a minor issue in an otherwise very attractive notebook.

The Eee has a nice touchpad,

although a little small.

There is a single-width button that will execute a right-click if you press down on the right-hand side. We found this a little difficult to get used to, as it was hard to tell without looking exactly where you were about to click. The touchpad will scroll if one traces a finger down the far right—an extremely small target we found difficult to hit reliably. We've read a lot of reviews that seem displeased with the keyboard, and frankly, we just can't see why. The keyboard has an excellent feel to it, although again, it is extremely small. It took less than an hour to get used to touch-typing on it at quite a reasonable speed.

The screen is LED-backlit, making it extremely bright. Unfortunately, that's the only kind thing we can say about it. The contrast and colour is dreadful, and although the screen is a reasonable DPI, the resolution is just not high enough for Web browsing. Most sites these days are optimised for at least a 1024x768 resolution, and having a screen only 800 pixels wide made us scroll sideways fairly often to see whole pages.

The speakers are surprisingly good. Sure, the sound isn't studio-quality, but the volume can be maxed out without

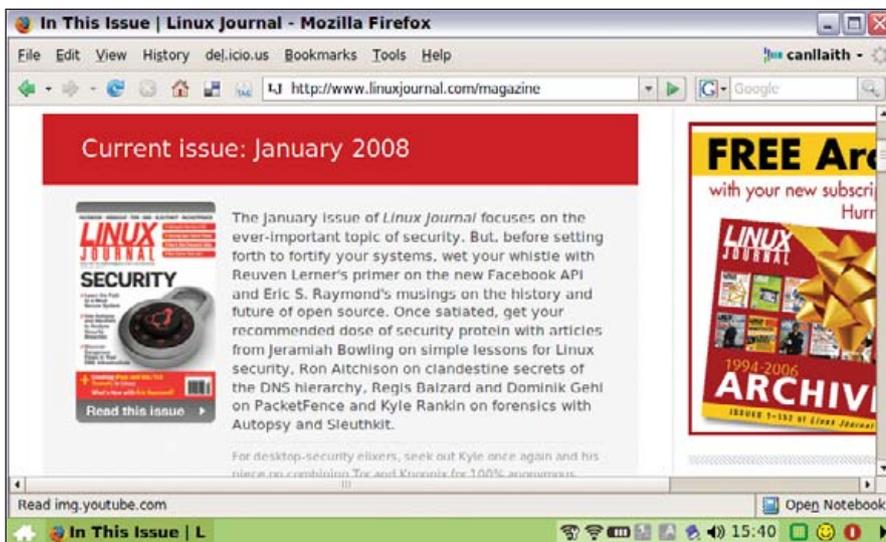
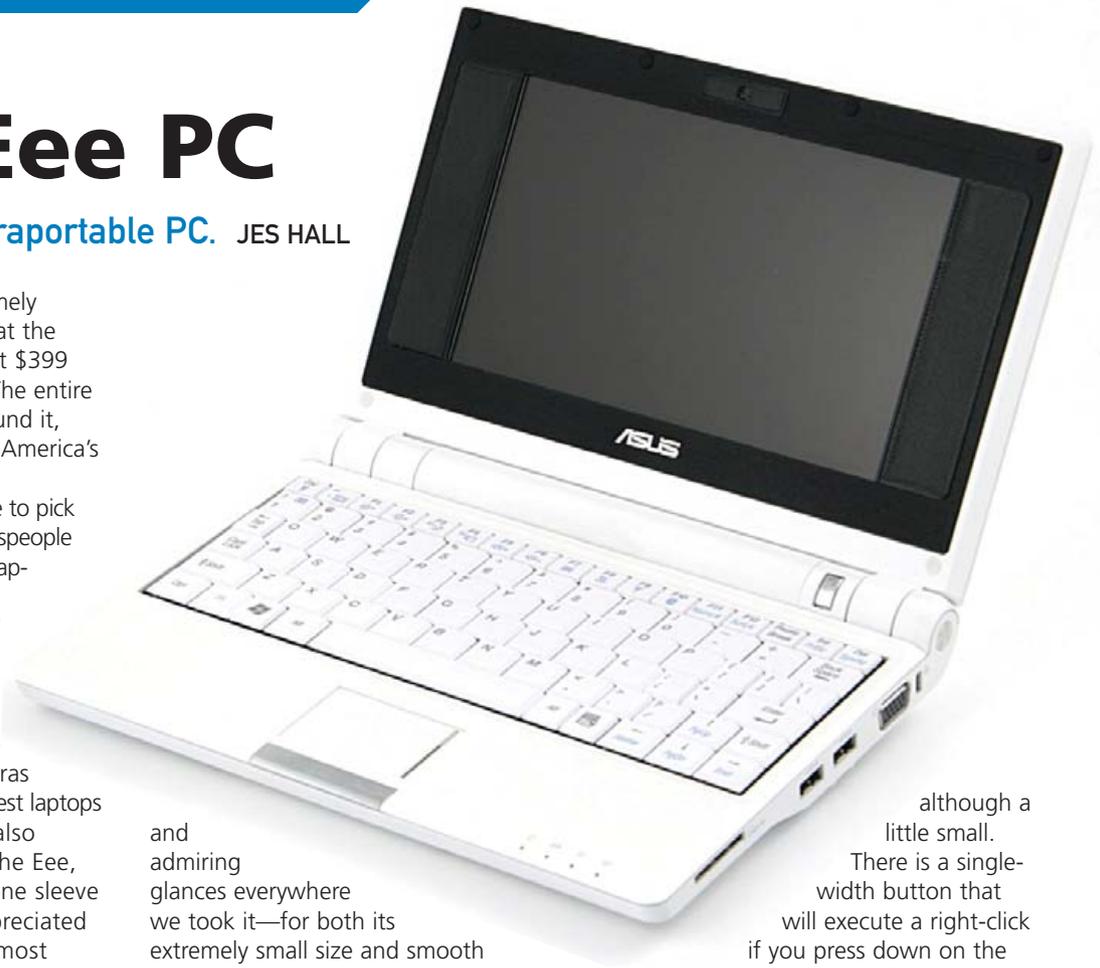


Figure 1. Web browsing shows how cramped the Eee screen is.

distortion, and the clarity is acceptable. With good headphones, sound is even better, although it did have a slightly muddy quality. The headphone socket is extremely clean with no discernible hiss even at high volumes. The internal microphone is adequate for voice chat, and plugging in a headset with an external microphone works exactly as you'd expect.

Connectivity is excellent with 10/100 Ethernet, 802.11b/g wireless and three USB ports. There's also an SD card slot on the left-hand side, and the card sits flush with the side of the laptop. It supports SDHC cards, which is a very viable option for expanding the onboard storage. There's also a VGA-out port that displays up to 1280x1024 on an external display with excellent acceleration. This feature alone makes the Eee far more worthwhile for serious use, as the mediocre internal display becomes an acceptable compromise—having a tiny device to carry around, but a reasonable screen resolution while at home.

Software

ASUS's customised "easy" interface is built on Xandros and consists of a tabbed desktop application launcher and the IceWM window manager and panel. The interface is slick and well optimised for the low screen resolution. A home key on the keyboard where the Windows key usually is minimises all applications and reveals the program launcher. It's pretty clear ASUS anticipates that most people will be running

applications maximised. The launcher tabs are divided into Internet, Work, Learn, Play, Settings and Favourites.

The Internet tab includes launchers for Firefox, Skype and the Pidgin instant-messaging client, as well as some shortcuts for loading Firefox with a preconfigured page to access services, such as Wikipedia, various Webmail providers and Internet radio. The version of Skype installed does not support video chat, which we feel to be a fairly glaring omission for a device with a built-in Webcam.

The Work applications include Thunderbird for e-mail, KDE's Kontact suite for PIM and Adobe's Linux Acrobat Reader software. OpenOffice.org version 2.0 is available, and it performs surprisingly well given Eee's limited resources. One feature that isn't immediately apparent, but mentioned in the manual, is that a terminal can be accessed with the keybinding Ctrl-Alt-T. SSH and rdesktop are two applications that can be accessed this way for those who are terminal-savvy.

KDE's edutainment suite is well represented under the Learn tab with science-, language- and math-related educational tools from the project included. Tux Typing, Tux Math and Tux Paint complete the selection. With the addition of on-line learning facilities, we feel the Eee would make an excellent educational aid.

The Play tab includes quite a few subcategories for various types of media. A basic image viewer

Specifications

- 4GB solid-state Flash disk
- 512MB, 400MHz DDR2 memory
- 900MHz Intel Celeron Mobile
- Intel 945GM Graphics
- Atheros 802.11b/g wireless
- 9" screen at 800x480 resolution
- Three USB 2.0 ports
- Kensington lock slot
- SD/MMC reader
- VGA out
- 10/100 Ethernet
- Headphone and microphone jacks
- 640x480 Webcam
- Customised Xandros OS
- IceWM, with ASUS enhancements

(Gwenview) is included, as well as an excellent MPlayer front end capable of viewing most multimedia formats. We found that getting high-quality, full-screen, highly compressed media content was quite the struggle, but with a bit of practice, we're sure we can encode some video files that the Eee will play well. DVD content off an external drive plays reasonably.

We were very pleased to see some of our favourite procrastination-enablers under the Games tab. *Frozen Bubble* is insanely addictive, and *Crack Attack* looks like it will be second on the list of "Reasons This Review Will Almost Certainly Be Late". *Penguin Racer* and *Potato Guy* are old-fashioned favourites, and *Solitaire*, *Sudoku* and a *Tetris* clone round out the selection.

The Settings tab allows for minimum configurability—here are options for setting up printers, configuring the touchpad and checking for updates, among others. We eagerly looked



Figure 2. ASUS "Easy" Interface

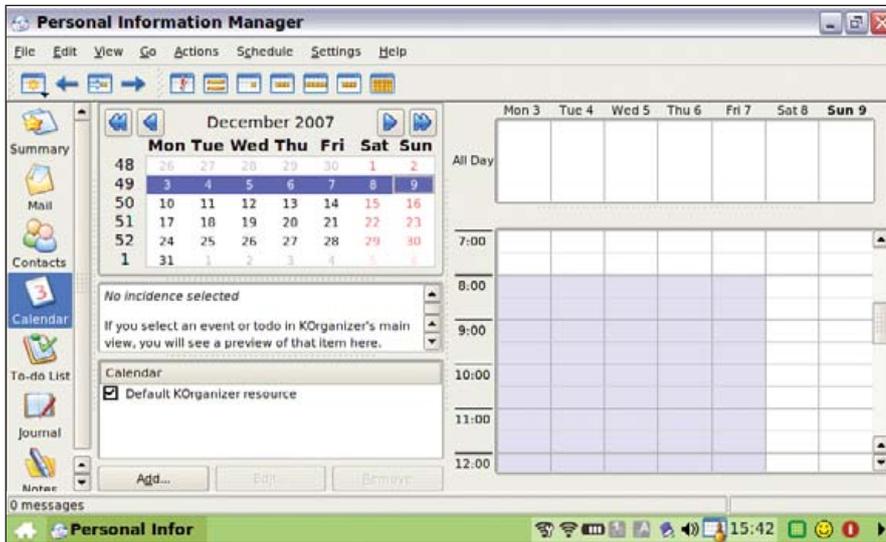


Figure 3. Contact's excellent PIM suite is a little squished.



Figure 4. How can a game this simple be so insanely addictive?

through the personalisation dialog but were disappointed to see it did not allow us to change the theme to one that does not attempt to model Microsoft Windows XP's much-hated style. The tool to enable an external display is simple and straightforward—something we certainly haven't found on other Linux desktops.

The Favourites tab lets us create launchers to our favourite applications, although there was no way of creating a launcher to an application that wasn't already on another tab. The option to create a custom launcher would be appreciated.

The first thing we tried was connecting to various wireless networks, using a USB GSM modem. For some unknown reason, there actually are two networking tools installed on the Eee: one that can scan and connect to wireless networks, and one that handles all other connections and saved profiles for wireless networks. It took quite a few connections where we had to enter the key in every single time before we discovered the second tool, with the key saved. It seems utterly needless to have two separate tools for this when the various Network Manager front ends are an excellent

We were blown away by how easy it was to configure a USB 3G modem—the connection wizard did almost all of the work for us, and we were on-line within five minutes.

example of an all-in-one tool that's painless to use. Hopefully, ASUS will merge these tools in a later release.

We were blown away by how easy it was to configure a USB 3G modem—the connection wizard did almost all of the work for us, and we were on-line within five minutes. Powering the modem seems to reduce the battery life to about two and a half hours, but we still were impressed that the laptop and modem are less than 1kg to carry around. Battery life in general is a bit of a sore point. The Eee gets a little more than three hours in our testing, if it's on wireless, and we feel this just isn't really enough for an ultra-portable. That said, the power adapter for the Eee is quite small; it looks a bit like an oversized cell-phone charger. Carrying the charger to top up the Eee whenever you happen to see a power point really doesn't add much weight or bulk.

Although we appreciate that the Eee could include only so much for the price, it would have been nice to see Bluetooth support and a larger screen. At the end of the day though, every time we thought of a way the Eee could be improved, we kept coming back to the price—\$399. The cheapest ultra-portable from other vendors is closer to \$1,200, and those aren't as small or totable as the Eee. It's no wonder that the Eee is taking off so quickly and developing such a following. Out of the box, it's a compelling little appliance.

Most of the Eee's downsides are eliminated when you see how the machine can be customized. With some custom packages and a full Linux desktop, the Eee is a formidable tool for the intermediate Linux user. In my opinion, the Eee is five minutes away from being a great backup writing and open-source development



Figure 5. Networking Tools

tool. Install Subversion, add a USB HSDPA modem, and I'd have an extremely portable, very cheap and rugged tool for basic hacking tasks and for writing arti-

cles—most of this article was written on the Eee, sitting in various cafés around Wellington. With a USB-to-serial adapter and the addition of minicom, it would be

a great tool to take into server rooms to aid me in my day job as a sleep-deprived systems administrator. It's been my constant companion for the past few weeks—coming with me to places I wouldn't dare to risk my far-more-expensive and delicate Sony Vaio. Throw it in a backpack or even a large handbag, and it's ready and waiting. I'd far rather risk spilling beer on it at a pub hackfest, getting knocked around in my carry-on luggage or being taken to conferences where I have an absolute gift for having computers stolen. Although \$399 isn't cheap enough to make it disposable, it's far more so than something costing \$2,000.

Next month, I'll take you through various ways the Eee can be hacked to unlock the full power of the Linux it's running underneath, and I'll also take a look at trying different Linux distributions on it. ■

Jes Hall is a Linux Technical Specialist and KDE developer from New Zealand. She's passionate about helping open-source software bring life-changing information and tools to those who would otherwise not have them.

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SOFTWARE

IBM's Unfinished Symphony

When Lotus Symphony faces the music, the question becomes, "Do we really need another proprietary office suite based on OpenOffice.org?" **BRUCE BYFIELD**

Talking about IBM Lotus Symphony in any meaningful way is impossible without constant references to OpenOffice.org. Consisting of three applications—the self-explanatory Documents, Presentations and Spreadsheets—Symphony is not only a proprietary rival to OpenOffice.org in the cross-platform office space, but also is based on OpenOffice.org code, a move made possible by OpenOffice.org's release under the GNU Lesser General Public License. Under these circumstances, comparing the two applications is by far the quickest and most accurate way to explore Symphony's general features and interface, as well as what new features it adds to the codebase and what it leaves out.

To say the least, the result is mixed.

Specifically, Symphony is the OpenOffice.org 1.14 code dropped into an Eclipse framework, without any attempt to include the various add-ons available for the original. The version choice has the advantage of ensuring that Symphony is based on a mature codebase, and the reliance on Java sidesteps the need to bring developers up to speed on every intricacy of OpenOffice.org's notoriously cryptic code.

However, these choices also extract a price. For one thing, version 1.14 is two years old and missing many of the improvements in the 2.x releases. These include such features as version 2.3's new chart system, the ability to use movie and sound clips in presentations, and the expansion and improvement of the on-line help. All that Symphony seems to have borrowed from later releases is the enhanced drawing toolbar.

As for any add-ons, forget them. Symphony does not even include ExtendedPDF, which gives users expanded control over exports to PDF. Although Symphony does allow exports to PDF, the feature is basic compared to

the one offered in the latest versions of OpenOffice.org in most distributions, which install ExtendedPDF by default.

Similarly, although reliance on Java may speed development—IBM boasts that the current beta 2 was developed in less than two months—it does not make for compact apps without careful coordination of development. Symphony's installation size is huge—683MB compared to less than 200MB for recent versions of OpenOffice.org, even though it does not include versions of OpenOffice.org's drawing, database and equation editors. Symphony's start-up speed is slow too, taking at least twice as long as the latest versions of OpenOffice.org using the same equipment. Although these figures may improve in later releases, they seem unlikely to match OpenOffice.org's any time soon.

The Interface

Despite improvements during the last two years, including a change from battleship gray to beige, OpenOffice.org's interface has never been an example of beauty. It tends to be ramshackle, never sure if it should borrow from MS Office and other proprietary apps or develop its own design. Nor has any attempt been made to enforce design standards, which means that new features, such as the dictionary and font installers, follow a logic of their own. If there ever was a program that demanded an interface redesign, it was OpenOffice.org.

And, at first glance, Symphony provides that redesign. Its selection of blues with the occasional orange highlight may be chosen mainly for IBM branding, but the overall effect is much more unified and pleasant to the eye than anything OpenOffice.org has managed to offer so far. However, this unity is mainly

on the surface. Open a dialog box, and you are back with OpenOffice.org's familiar, starkly functional designs.

In much the same way, Symphony attempts to edit and rearrange OpenOffice.org's menus. Because many OpenOffice.org features are omitted (see below), Symphony can hardly help but have shorter menus, making them easier to use. In fact, Symphony even has the space to make some features more prominent, dragging the Direct Cursor out of Tools→Options to place it in the Edit menu, or to make page numbering a top-level item rather than hiding it among Insert→Fields to the puzzlement of new users. Such changes can only increase ease of use.

Too often though, the changes seem arbitrary. Replacing Format Cells with Text and Cell Properties in Spreadsheets does nothing for clarity, any more than replacing the Format menu with Layout or the Insert menu with Create does. And, is there any reason for labeling spreadsheets with letters instead of OpenOffice.org's numbers?

The same mixture of usefulness and arbitrariness occurs with the positioning of items. Moving the Options item from the Tools menu to the File menu (where it is called Preferences) seems sensible, because the File menu is where you expect to find basic setup settings. But, why shift page setup from Format/Layout to the File menu? The fact that MS Word used to do so hardly seems reason enough.

A more concrete improvement is Symphony's borrowing of a Web browser format, opening on a useless Home page and opening new documents by default in tabs in the same window. From there, a document can be opened in a separate window via a right-click. This arrangement is enhanced further by a thumbnail view of documents in the Window menu, which can be set to view only a specific type of document.

However, the addition of a docked Properties window on the right side of the editing window is less useful. This window displays elements that are selectable from the menu in OpenOffice.org, showing Text and Paragraph settings in Documents, Page settings in Presentations and cell settings in Spreadsheets. Anyone familiar with OpenOffice.org might

wonder not only about the advisability of another floating window to add to the Navigator, Styles and Formatting, Gallery and Data Sources (although Symphony eliminates Data Sources), but also why the Properties window is so important that it is the only floating window that can be docked on the right side of the editing window.

Even more important, the effect of showing the Properties window by default is to encourage manual formatting at the expense of styles. Particularly in the word processor, this emphasis is equivalent to teaching someone to make hand signals when learning to drive and not bothering to mention the signal light. More than any other office suite, OpenOffice.org relies on styles, with several features, such as tables of contents and outlines, being much more difficult to use if you rely on manual formatting.

Perhaps the Properties window is in response to OpenOffice.org users who do not want to be forced into using styles (as though styles were anything except a time-saver for them), but its prominence suggests that Symphony's designers do not understand the logic of the program they are mutating. If you are using the code the way it was intended to be used, the Properties floating window is an irrelevance.

Missing Features

To those familiar with OpenOffice.org, one of the distinguishing characteristics of Symphony is how many features have been ripped out. In all the applications, the list is a long one.

To start with, many features for interoperability are missing. For instance, unlike in OpenOffice.org, in Symphony you cannot store data for use in other documents, embed one document in another or export a list of headers in the word processor to create the slides in a presentation.

In Documents, the list of the missing continues. All wizards are gone, as well as any capacity to create labels, business cards or anything else that requires a mail merge. No Autotext, bibliographies, hyphenation, thesaurus, outline numbering, autoformats for tables or master documents are available. Neither are many types of fields, including ones for hidden paragraphs or text, input lists, document information or user data.

Presentations and Spreadsheets are

somewhat less devastated. Still, Presentations lacks the initial wizard or any sound support, and Spreadsheets lacks the ability to split or freeze windows to improve the viewing of long documents or to autoforamt selected cells. However, in Presentations, you might think that more is missing than really is the case, because many items are concealed in main and right-click menus, and combo boxes for things such as slide transitions list only a half-dozen items at a time and require clicking Other to see other selections.

In none of the three programs can you edit keyboard shortcuts or customize menus and toolbars. You still can run macros, but without these customizing features, they are less accessible. Instead of assigning them to keystrokes or adding them to the toolbar, you have to drill down through several levels of menus in order to use them.

What is left is enough for most users in undemanding circumstances. Still, the logic behind what is omitted is obscure. Although the tendency is to exclude anything that requires instruction to learn or increases users' ability to customize, perhaps the true reason is to trim the hard drive requirements as much as possible.

New Features and Old

Against these omissions, Symphony boasts only a handful of innovations. The single window for opening applications includes a Web browser accessible from the New button, but this hardly seems the time to introduce one. OpenOffice.org dropped its Web browser when its code was first released, and the integration of applications on GNU/Linux desktops is strong enough that nobody has missed it since.

Otherwise, new features—as opposed to ones made more prominent by repositioning—are surprisingly few in Symphony's applications. Aside from the single window with search and thumbnail features, probably the main addition is the Freehand Table feature it borrows from MS Office. And this feature, although showy, is slow and impractical compared to choosing the number of rows and columns by dragging the mouse over a grid.

However, Presentations does include one legacy feature that longtime OpenOffice.org users might still be pinning for: the arrangement of slides in

tabs. This arrangement is more economical with space than the slide pane that replaced it in OpenOffice.org's Impress, allowing much more room to display the currently active slide. But, this feature is hardly enough to attract users by itself.

A Lack of Purpose

How Lotus Symphony fits into IBM's corporate strategy is anybody's guess. Perhaps it is a matter of corporate pride, an attempt to revive a product line that was a contender in the office application market more than a decade ago? A desire to support open standards by releasing programs that support the Open Document format?

If the intent is to undermine MS Office's dominance on the desktop, as some have alleged, then as an underfeatured, proprietary application, Symphony seems to have poor odds for success. So far, at least, there is not even any evidence that Symphony will integrate with Lotus Notes to offer the combination of office applications and calendaring that OpenOffice.org lacks. IBM would strike a greater strategic blow if it contributed directly to the latest version of OpenOffice.org instead of focusing on what seems a quixotic and halfhearted project at best.

That, in the end, is why Symphony disappoints. As a project, OpenOffice.org badly needs some fresh ideas. Its interface probably needs redesigning from the ground up, both in terms of names and positioning of features. Some features deserve to be more prominent, while some may be no longer relevant or require radical redesign. Symphony attempts all these things, but with no clear vision and only halfheartedly.

In the end, all Symphony offers is a version of OpenOffice.org stripped to the basics and suitable mainly for those who won't take the time to learn to use office applications properly. Such an outcome is disappointing for those who would like to see OpenOffice.org undertake some basic improvements, and not nearly sufficient to justify Symphony's independent existence. ■

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SOFTWARE

Domo Arigato Mr Androidato—An Introduction to the New Google Mobile Linux Framework, Android

All your phones, are belong to Google—a brief overview of Android, the new software stack created by Google for the Open Handset Alliance. ADAM M. DUTKO

The Open Handset Alliance (OHA) is an industry trade group comprising more than 30 technology and mobile companies. The focus of the OHA is to accelerate innovation in the mobile application and hardware space and to provide consumers with a more comprehensive and inexpensive mobile device experience. Android is a new, mobile application development framework developed by Google for the OHA that represents part of a greater promise from OHA members to make the open platform an industry success.

Along Came an Android

In addition to announcing its intent to bid on the C Block of the 700MHz wireless spectrum recently, Google continues to lead the charge to ensure that the FCC mandates the spectrum be open for all mobile devices and all operating systems. These two points are partly why the Android announcement is so important. Imagine using your phone as you do now, but with the option to modify it like you do your desktop computer. With Android, you will be able to tweak a subset of software on your phone to your liking—more so than merely changing the background, selecting a ring tone or downloading carrier-sanctioned software. If this idea becomes a reality, it might herald the beginning of a new era of personal computing and possibly even foster the creation of a new generation of small mobile phone companies and software vendors. Without waxing too philosophically on the benefits of an open spectrum, open devices, open software and open access, let's get to the meat of the problem, or shall we say, the logic of the Android.

The Meat

The key features of the Android Software Development Kit (SDK) include an application framework, a memory-optimized runtime environment named Dalvik (so called because of one of the main engineer's affinity for the Icelandic town), an integrated browser based on WebKit, a custom 2-D graphics library, a 3-D graphics library based on OpenGL ES 1.0, structured data storage through SQLite, support for a variety of media formats (MPEG-4, H.264, MP3, AAC, AMR, JPG, PNG and GIF), and hardware-dependent support for a multitude of components (GSM, Bluetooth, EDGE, 3G, Wi-Fi,

camera, GPS, compass and accelerometer). All of this functionality is accessible through the Eclipse IDE or on its own through the user's own Java environment. The platform also includes an emulator, debugging utilities, memory and performance profiling tools, and the source code for a set of example programs.

So Many Layers, So Little Time

The Android framework consists of four layers, as shown in Figure 3. At the top of the stack is the aptly named Applications layer, so called because it is where finished applications are assembled and situated in the framework. The second is the Application Framework layer, where the building blocks of each application are created using the underlying system libraries and associated application code. Next comes the Library and Runtime layer where core system libraries, Google Java libraries and the Dalvik virtual machine reside. The fourth and final layer is the Kernel layer, where Linux (version 2.6.x) communicates with the underlying hardware.

Application Layer

The Android operating system is a multi-process system, wherein system and application processes run within their own ID space. Security between applications and the system is maintained at the process level using standard Linux facilities, such as Discretionary Access Controls (DACs). When an application is installed, it is given a unique user ID on the system for the duration of its installation lifetime. This unique user ID affords the application a dedicated and protected execution stack within the Android system.

The default behavior of an Android



Figure 1. Browsing the *Linux Journal* Web site using the WebKit-based browser on the Android emulator. This particular screenshot highlights the built-in zoom feature that enables you to see a full-size view of a Web site.



Figure 2. Using the built-in Maps feature to find my hometown in Ohio. The maps feature works similarly to the one found on the Internet—first providing a world view, then allowing you to pick a particular region and keep zooming until you reach the magnification limit or are satisfied with what you see.

application is to operate within its own container on objects it owns. In other words, Android applications have no permission to perform operations that might adversely impact the user experience or associated data. This behavior can be modified in two ways: 1) the programmer can explicitly share application space with another application, or 2) the programmer can explicitly share application components with other applications and the system. These exceptions are made through the application manifest file.

The manifest file, `AndroidManifest.xml`, is a file required in every application, and it resides in the root of the application folder. It not only provides a means for defining the security characteristics of your application, but it also provides an outline of your application in the form of exposed application components known as activities, intents, receivers, services and providers. More information on the manifest file is available on the Android Web site (see Resources).

Application Framework Layer

Designed with reuse in mind, this layer enables programmers to piece together five types of components to create the basic building blocks of an application:

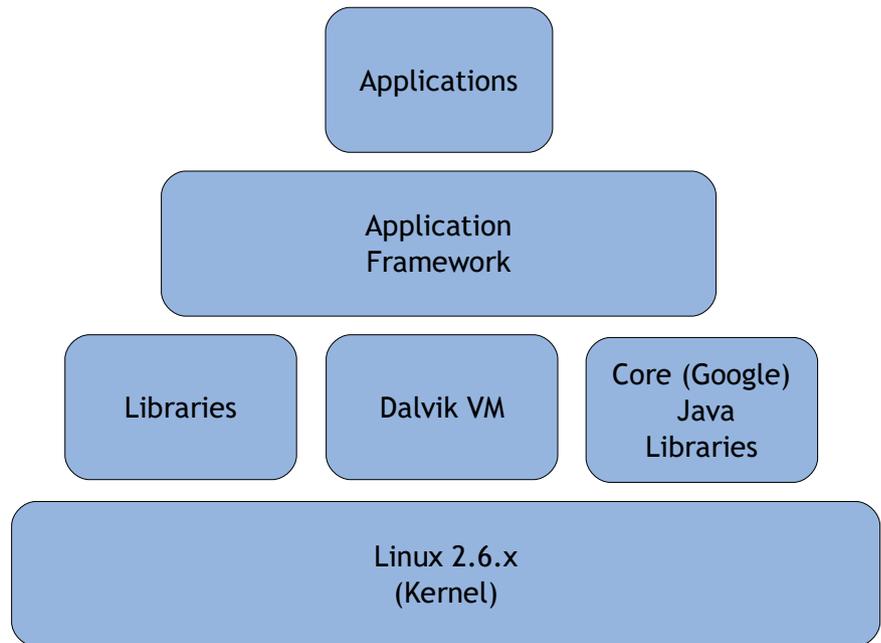


Figure 3. Hierarchical View of the Android Framework

1. Views
2. Content Providers
3. Resource Managers
4. Notification Managers
5. Activity Managers

The first component, Views, represents the most basic piece of a user interface. Each view is responsible for managing the layout and events associated with the screen area it represents. Views can be grouped together to form Viewgroups and arranged into a hierarchical tree, with other views and Viewgroups. This tree forms a user interface for a particular application activity, such as entering a new contact into a contact book or adding a note to your diary.

The next component is the Content Provider. Content Providers enable a programmer to define a resource from which to pull or push data using a Content Universal Resource Indicator (ContentURI) wrapper and a Universal Resource Indicator (URI). Each ContentURI wraps around a unique type of data, such as contacts, settings and call logs, and provides helper methods for accessing associated data referenced through a URI. Programmers are free to dictate how they want to store, retrieve and modify publicly

shared application data, but they must create the provider with a repeatable way to query and return data.

To accomplish this requirement, each URI must contain at least three components: the standard prefix of `content://`, the data authority and the data path to the content provider. An additional component can be added to the URI if the programmer wants to request a specific piece of data by unique ID, but the fourth component is only necessary when the application programmer is faced with having to know the exact ID of a record. When put together, a typical URI might look like `content://contacts/people/42`.

You also can use a URI to return a whole set of records. For instance, if you wanted to return the complete set of contacts, you would use `content://contacts/people`. Quite useful, no? But, what happens when you want to look up Ford in your contact book and can't remember the ID of the corresponding record? Android provides helper classes for each type of ContentURI for this exact situation, enabling users to find data provided by a particular Content Provider easily. The exact details on how to create, use and modify Content Providers, and how to use more-advanced concepts, like managed cursors, are explained in more detail on the Android Web site.

The next component is the Resource

Table 1. How the Android Framework Compares to Existing Mobile Frameworks

	Android	Motodev	Maemo	OpenMoko	Qtopia
License(s)	Apache2 (mirrored GPLv2.0/LGPL components)	GPLv2.0 (kernel)/proprietary	Many free and open-source licenses	GPLv2.0/LGPLv2.1	GPLv2.0 (Community Edition)
Company	OHA/Google	Motorola	Nokia	FI/COE	Trolltech
SDK (price)	Eclipse plugin or standalone (free)	Eclipse plugin (Community Edition, free)	VistaMax or Laika (some parts require a device)	OpenEmbedded (free)	Qt Tools (Community Edition, free)
Sign-up Required	No	Yes	Depends (OS requires valid device ID)	No	Yes (Community Edition, free)
Primary UI	Java	Qt	GTK+	GTK+	Qt
Primary Application Language(s)	Java (underlying libraries C/C++)	Java ME/C++	Languages with GTK+ bindings	Languages with GTK+ bindings	Languages with Qt bindings
Preferred Simulator	Android emulator	MotoDev emulator/Java ME emulator	QEMU	QEMU (and others)	Greenphone emulator (QEMU)
Primary Devices	Unknown (probably OHA devices)	Most Motorola mobile devices	Nokia N Series (and others)	Neo1973	Neo1973 (Greenphone discontinued)
Licensing	Free (some services cost extra)	Free (some services cost extra)	Free (device required for some OS bits)	Free	Free (noncommercial only)

Manager. Resource Managers provide a way to work with application-associated files that do not contain code, such as icons, layouts and files associated with application internationalization and localization. Because all resource files are compiled into the binary at build time by the Android build system, Resource Managers are sensitive to where files are located in the source tree. To make build errors related to misplaced external files easier to avoid, all Android projects created through the Eclipse plugin contain a resource directory named `res` at the root of the application source tree. The resource directory contains subfolders for specific types of data, which the compiler searches and verifies application code against at build time. The exact details on dealing with Resource Managers are quite complex, and the specifications for dealing with Localization and Internationalization are not yet complete, so if you would like to know more, please follow the link provided in the Resources for this article.

The next component is the Notification Manager. Notification Managers provide developers with the ability to alert users to events occurring on their devices. Some examples include displaying a view in the form of a notification

window when an e-mail arrives, alerting users to incoming calls by flashing the back light, or maybe even nagging users with a loud Britney Spears ring tone when the battery is running low. These are all typical examples of how you might use a Notification Manager in an Android application. The exact details on how to implement a Notification Manager also are located on the Android Web site (see Resources).

The final component of the Application Framework layer is the Activity Manager. Activity Managers are arguably the most important part of any application running in the Android framework. Activities are defined as user-performed atomic tasks that, when initiated by the user, elicit new behavior from the application. Such behavior might create a new view, retrieve data from a content provider or access underlying hardware to make a phone call. Such tasks are the foundation on which applications are built in the Android framework. Activity Managers are the components responsible for maintaining the navigation stack within an application and performing various housekeeping tasks based upon available resources and the particular state of an activity. In general, Activity Managers try to keep processes related to activities around for as long as possible,

but at times, they might be forced to free up resources by terminating particular activities. More information about implementing Activity Managers is available on the Android Web site (see Resources).

Library and Runtime Layer

The third layer in the Android framework consists of a set of shared C/C++ libraries, core Java libraries and the Dalvik virtual machine. The current set of libraries available in the Android SDK includes a BSD-derived implementation of `libc` optimized for embedded Linux devices, media libraries based on PacketVideo's OpenCORE, a display subsystem and 2-D/3-D management library called surface manager, LibWebCore, the SGL 2-D graphics engine, 3-D libraries associated with the OpenGL ES 1.0 API, FreeType and SQLite.

In addition to these libraries are the assorted core Google Java libraries. Some people have questioned the Android implementation of Java as proprietary, although others claim the implementation is a necessity for Google to optimize the Android framework. The important thing to remember is that the Google Java libraries provide only a subset of what the Sun Java libraries provide. The remaining portion of this layer is Dalvik. Dalvik is a memo-

ry-optimized Java Virtual Machine (JVM) created by Google to run optimized .dex bytecode. In addition to the Google Java libraries, Dalvik and the associated bytecode compiler dx remain a potential source of contention in the Free and Open-Source Software world. Google claims the source will be available soon, but remains mum about why it decided not to pursue these changes through Sun's open-source Java efforts.

Kernel Layer

The layer closest to the physical hardware in the Android framework is the Linux kernel. Android is scheduled to ship with version 2.6.x, and it will rely on Linux to manage a variety of services, such as security, memory management, process management, networking and drivers for a variety of devices.

The Android Eclipse

If you are interested in working with the Android SDK, you can do so through Eclipse or through other development environments or IDEs. If you want to use the Eclipse IDE, you need to have version 3.2 or 3.3 installed, along with the Eclipse JDT Plugin, as well as version 5 or 6 of the Java Development Kit (JDK). You also may want to install the Android Development Tools (ADT) Plugin through the Software Updates



Figure 4. The default menu for Android shown through the emulator. You can navigate the menu by clicking the buttons with your mouse or selecting them with your keypad.

menu using the following link: <https://dl-ssl.google.com/android/eclipse>. The ADT Plugin automates a lot of what you would have to do manually in order to develop Android applications, and it is recommended if you are new to Java development or if you are generally lazy like most programmers.

After you are done setting up your environment, you need to add the most important piece, the Android SDK. You can find the most recent version of the SDK at code.google.com/android/download.html. After downloading the SDK, it is recommended you verify the md5 checksum before unzipping the contents. Once you have verified the contents, you then need to unzip the contents to a location of your choice and add the corresponding path to the Android menu within your Eclipse preferences menu.

If you do not want to use Eclipse, you still need JDK 5 or 6 and Apache Ant 1.6.5 or later, in addition to the Android SDK. I leave it up to you to perform the necessary steps associated with sourcing the SDK components into the proper path if you choose not to use Eclipse. If you run into problems, it is important to note that the GNU compiler for Java (GCJ) is not supported, and that if you have JDK 1.4 installed, you will not be able to use the Android framework. If you have questions about installing the Android SDK and/or configuring your environment, more in-depth information is available on the Android Web site.

Robotic Memories

One of the best things about the Android SDK is how easy it is to get up and running. Using my existing Eclipse Europa environment, I was able to start work on my first application only a few minutes after downloading all of the components.

It literally took me a few mouse clicks and keystrokes to get the equivalent of a "Hello, world!" application running in the Android emulator, and only a few more minutes to get a Notepad application running. The next best thing about Android is that it is completely focused on application development and not on peripheral requirements, such as kernel compilation and installation. If you want to be completely focused on mobile Java application development, Android might be the mobile Linux framework for you. In short, Google has painstakingly taken the time to provide a great abstraction layer for developing mobile Linux applications, and it has provided a path to existing Java application programmers to create Google-enabled and OHA-supported applications.

Despite all these wonderful things, I must confess that I still felt slightly unsatisfied with Android. On the one hand, I was very happy to be able to start working on application development so quickly, but on the other hand, I felt like, that's it? Maybe it's because I was working with the beta version of the SDK and not all of the components have been released yet, but for some reason, I felt more like a kid snapping Legos together than a developer creating an application stack on which to run my new application. So, if you are like me and want control over your entire stack, I still recommend sticking with a more transparent and flexible approach like the OpenMoko framework. Just remember, that like all other free and open-source software projects, the choice is yours. ■

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Resources

Android: code.google.com/android

Android SDK: code.google.com/android/download.html

Open Handset Alliance: www.openhandsetalliance.com

A Java Developers Thoughts on Dalvik: www.oreillynet.com/onjava/blog/2007/11/dalvik_google_tweaked_nonstan.html

Eclipse: www.eclipse.org

Desktop Must-Haves

This article is an introductory piece to get you thinking about the Linux Desktop and all it can do.

DAN SAWYER

So, you've been playing around with Linux for a few years now—running a file server here, a firewall there—but you're finally getting around to migrating your desktop away from Windows.

After all, it's either Linux or Vista, and you don't fancy your whole system being locked down with badly implemented DRM or crippled by system requirements.

Because when must a mere operating system need 15GB of hard drive space, 512 MB of RAM and a 1GHz CPU just to boot up?

Moving from Windows-land isn't merely a matter of changing the operating system. Unless you're keen on setting up CrossOver Office and moving all the compati-

ble applications across (a problematic enterprise), you're going to have to learn a few new programs that do the same jobs on which you depend. But, before you learn those programs, you need to know what they are.

Based on a thoroughly informal and unscientific survey of those who tolerate me best, I've drawn up a list of the things most people do or need access to on their computers every day. It turns out that most people, at least in my demented little corner of the universe, still use their computers for a fairly narrow range of tasks—certainly more tasks than ten years ago, but not many more. Those tasks fall broadly into four categories: Office, Graphics, Internet and Entertainment.

OFFICE

Believe it or not, even though it's not how people spend most of their computer time, office software is the corner of the computer market of which people are most aware. And, why wouldn't they be? Office software is what we use to manage finances and priorities, create presentations, keep schedules and write letters, papers, diaries and books.

Of course, what you're going to need on your desktop usually is not the same as what you'd need on a work machine. Nevertheless, being a small-business owner, I tend to pick my software with an eye toward openness of data, migratability, interoperability and room for growth. In other words, I want to be able to get at my data from a number of programs, not only the one with which I created it. I want to be able to migrate painlessly to another software package should my requirements grow or change enough that I need to change my applications of choice. I want the programs I use to be able to talk to each other and to other programs out in the broader world. For example, if I write a short story and send it to a friend to proofread and mark up, I want her to be able to read what I send, and I want to be able to read her annotations in red text when she sends it back. I also want my software to be able to do more than I need right now, because if my needs grow, it's less bothersome to learn a new aspect of an existing program than to bring in a support application to supplement it or to migrate to a whole new backbone. Because I have to deal with this stuff every day, I tend to take it into account when recommending software.

So, to start off with our office software, it's best to kill four (well, three and a half) birds with one stone. Most people need to write and edit documents, track numeric data on a spreadsheet and create PowerPoint-style presentations for work, church or underground revolutionary cult meetings (you know, like Linux user groups). Sometimes, people also might want to create a database in an Access-style graphical environment to keep tabs on cult membership or lists of evangelism projects.

Evaluating office software in Linux, when coming from Windows, can be quite dizzying. With KOffice, GNOME

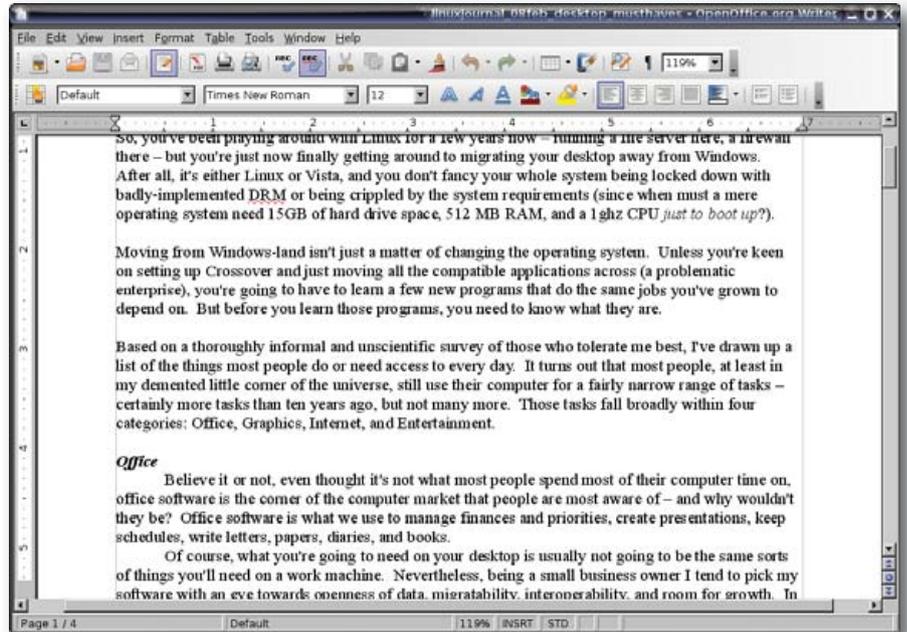


Figure 1. OpenOffice.org Writer

Office, OpenOffice.org and a whole raft of word processors and spreadsheets, it's easy to become overwhelmed.

But, for my money, the OpenOffice.org suite stands head and shoulders above the rest. It reads and writes more formats better, and it's less crash-prone and more versatile than most of the alternatives (KWord from the KOffice suite being a notable exception, as it can double as a layout program in a pinch). OpenOffice.org is more resource-hungry though—its only major drawback. High-end spreadsheet users who require complicated scripted math also may want to check out Gnumeric (from GNOME Office) to supplement their office software, as its functions are more powerful.

Aside from the traditional office suite, good bookkeeping software probably is the single-most basic function people require of their computers when the computers are employed as tools. Let's face it, of all the sticking points for Windows-to-Linux migration, this ranks right up there with "my games won't run" and "I can't do without Photoshop" as one of the biggest complaints. Nobody wants to give up Quicken, and less than nobody wants to re-enter years of checkbook, credit and tax records from scratch.

Two good candidates exist in this arena—good meaning, works well, reads and writes Quicken files painlessly

and doesn't require special skills to set up and administer. Of the two options, KMyMoney and GnuCash, the former is better-suited for home finances and the latter is better-suited to small business. Both are easy to use and easy to set up, although I prefer GnuCash both for its accounts payable/receivable and invoicing capabilities, and for its extensive and far-above-par documentation. It also interfaces nicely with on-line banking standards.

Although not something that generally is at the top of anyone's list, everyone needs a good PDF reader. Fortunately, not only is Adobe Acrobat Reader available for 32-bit Linux, but also two excellent PDF/PostScript viewers are available in the open-source realm with very comparable feature sets: KPDF (bundled with KDE) and Evince (bundled with GNOME). Neither rises quite to the level of Acrobat Reader—support for locked e-books is missing, for example—but both have one key edge on Adobe's current offering. Because they're open source, they are available for 64-bit systems as well as 32-bit systems, without having to mess with goofy workarounds and wrappers.

Time and communications management are the final stone in our office software rampart. Again, the Open Source world provides an embarrassment of riches: Sunbird and Thunderbird from

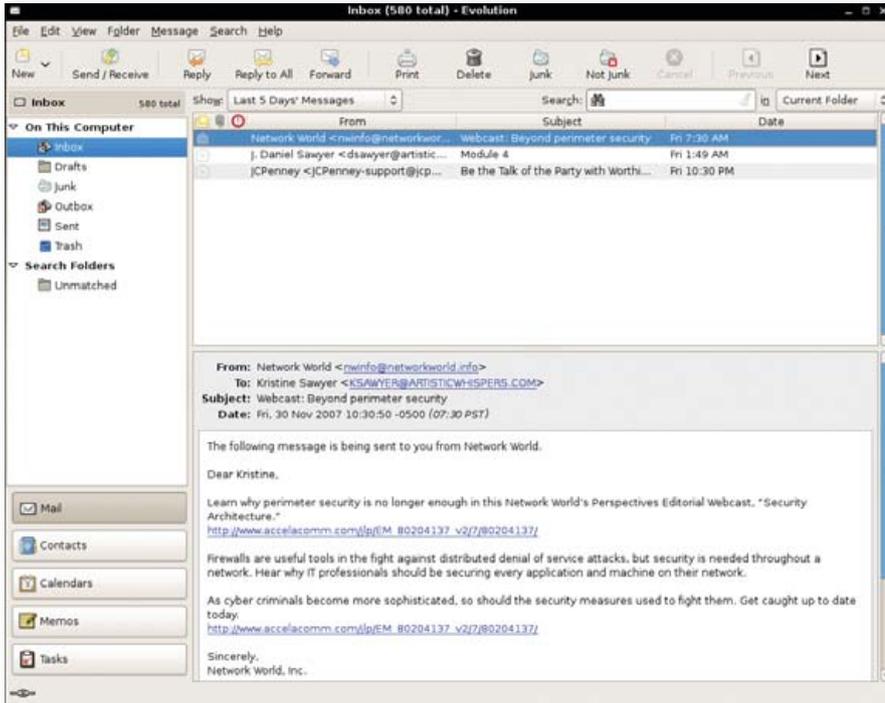


Figure 2. Checking E-Mail with Evolution

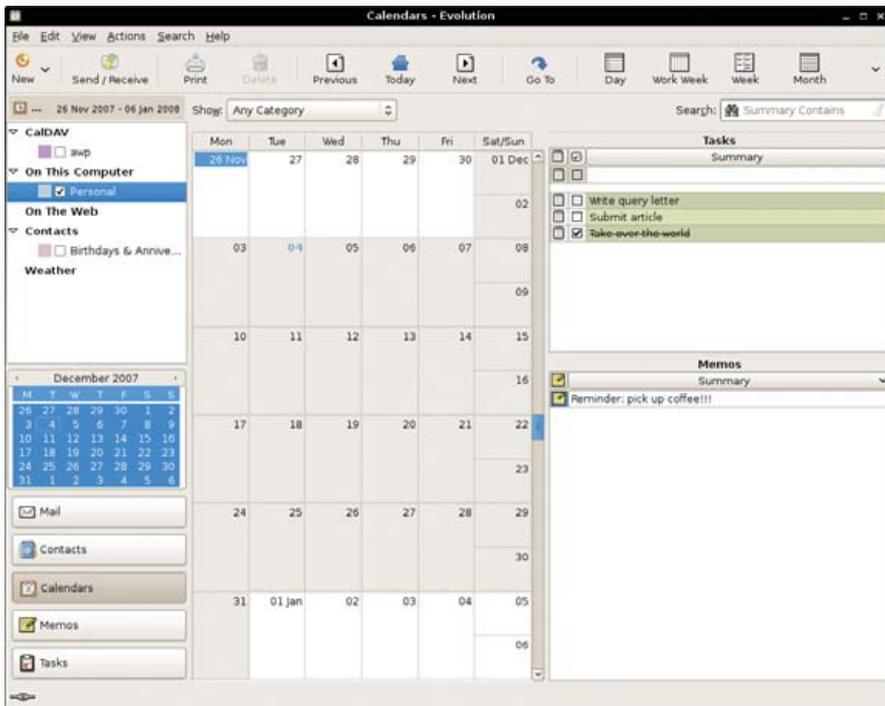


Figure 3. Evolution's integrated calendar, which interfaces tightly with the e-mail client, gives easy control over schedule keeping.

the Mozilla Project, KMail (which includes KMail and comes bundled with KDE), Evolution, Pine, J-Pilot—the list seems endless. It's possible to lose entire weeks evaluating the finer points of

each (and each has many fine points). However, most people need a good task manager, a good calendar, a good e-mail client with great spam filtering, and a way for all of them to talk to

each other while being fairly worm-impervious. Of all the above, only two packages put this all together: KMail and Evolution. KMail is more heavily integrated in KDE, and Evolution has good integration with GNOME. But on balance, Evolution is more spry, has a better interface design and is easier for the average end user to administer without sacrificing quality and sophistication. KMail is well on its way to this point, as is the Mozilla Sunbird/Thunderbird combination, but neither has risen to Evolution's level yet. Evolution offers a further advantage to small business users in that it interfaces with popular groupware applications such as Outlook and WebDAV. Granted, most people don't need groupware, but they do need a way to keep track of what's going on in their lives, and Evolution does the job swimmingly.

INTERNET

Bar none, the one thing that people do most with their computers is live on-line. Web browsing, social networking, instant messaging and e-mail are the most vital ways the postmodern Webizen stays in touch with the rest of the world. We've already touched on e-mail. The other non-browser-centric way people keep in contact is via instant messaging. There are a number of IM clients on Linux; some of them are protocol-specific (such as Amsn, which also supports audio/video conferencing for the Microsoft Messenger Network), and some of them are universal. The best of breed for the universally compatible ones is Pidgin.

Once known as Gaim, but forced to change its name due to a trademark dispute, Pidgin is a multiprotocol instant-messenger client with tabbed message windows and an impressive array of plugins, including support for two very powerful encryption schemes to keep conversations private. The interface is simple, the program is easy to use, and it doesn't get in the way—all must-haves in an IM program. Pidgin doesn't support audio or video chat (few clients for Linux do), but all the other great peer-to-peer conference features to which users are accustomed are readily available.

Of course, when talking about Internet software, one must discuss the granddaddy of all Net software, the

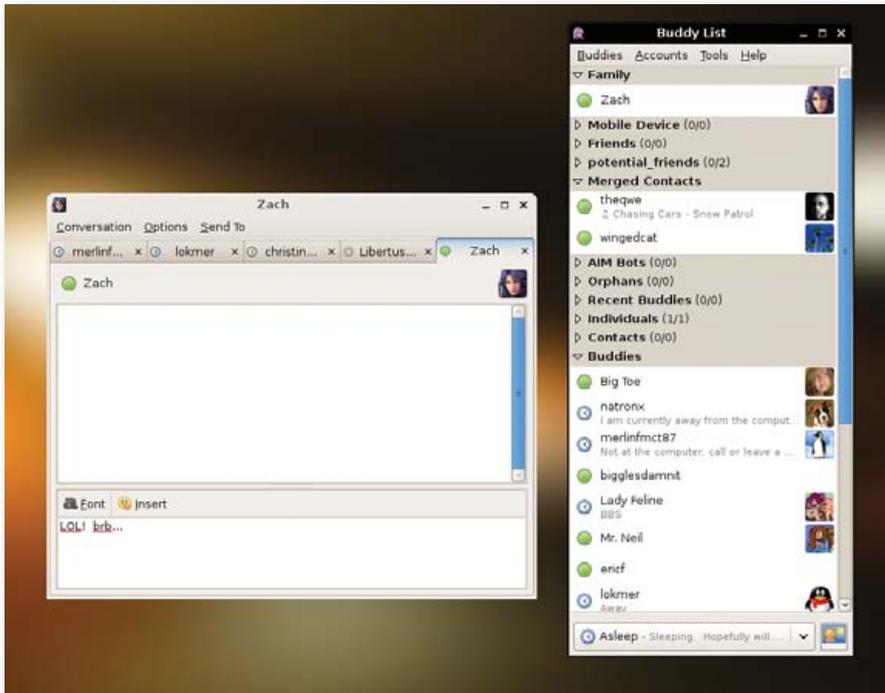


Figure 4. Pidgin sports a multiprotocol buddy list and a tabbed message interface to keep your chats well organized.

Pidgin doesn't support audio or video chat (few clients for Linux do), but all the other great peer-to-peer conference features to which users are accustomed are readily available.

embedded Flash and JVM players, and give you good, intuitive privacy management with a reasonable level of security, there is only one choice, Mozilla Firefox.

GRAPHICS

A few years back, this wouldn't have been a relevant category, but between the ubiquity of digital cameras and the glut of presentation software, everybody needs a graphics package—two of them, actually: one to organize the photos (otherwise, how are you going to find that perfect shot among the thousands you rattle off each year?) and the other to edit them.

Organizing photos is a tricky job, though it's one that people are a lot more familiar with in these days of Flickr than they were ten years ago, when the shoebox at the back of the closet overflowed with pictures to sort and put in albums...someday. In the Mac world, everyone uses iPhoto. It's ubiquitous, it makes slideshows, and it does rudimentary adjustments in the program. On Windows, there's Picasa, which is focused more on printing than indexing. On Linux, there's F-Spot and digiKam. F-Spot is a rudimentary, but user-friendly, indexing system. digiKam, on the other hand, is far more sophisticated, with integrated color management, gallery creation, iPod interface, slideshow and calendar creation, and RAW format handling, all underneath a well-laid-out interface. In this game, it's the clear winner.

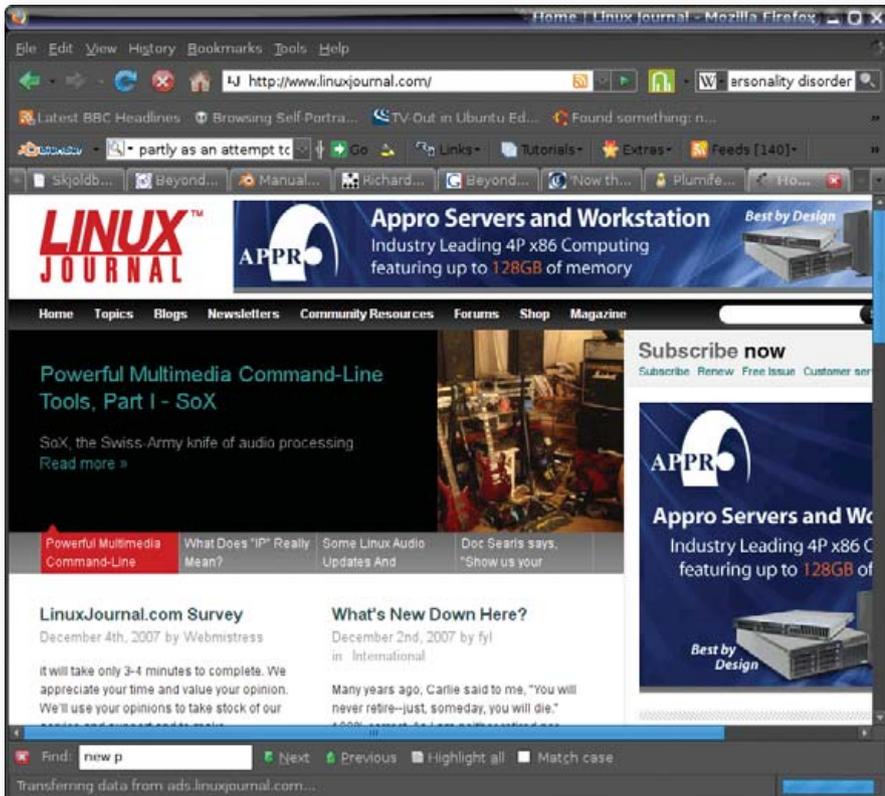


Figure 5. Firefox, the Best-of-Breed Browser

Web browser. Although there are a lot of viable options for simple Web browsing, if you're looking for something that

will give you tabbed browsing and RSS feeds, support Flash videos and games, let you watch audio and video in

FEATURE Desktop Must-Haves

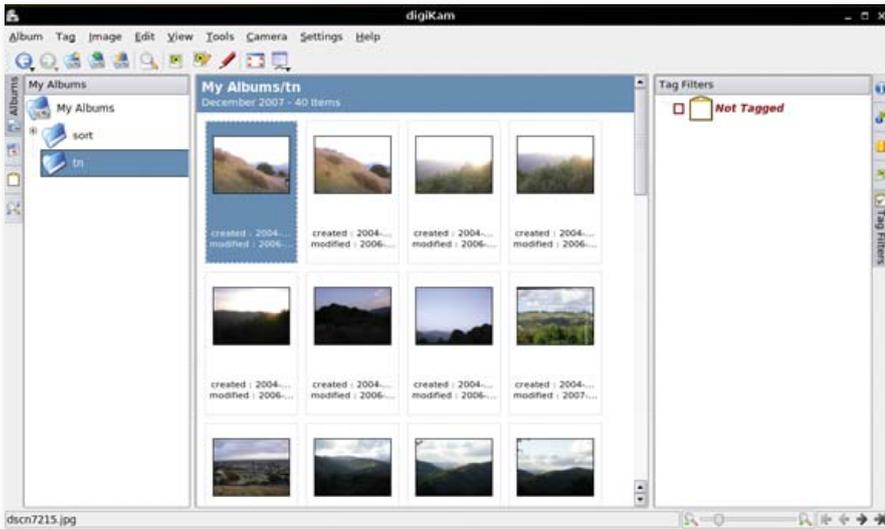


Figure 6. Browsing through Albums with digiKam

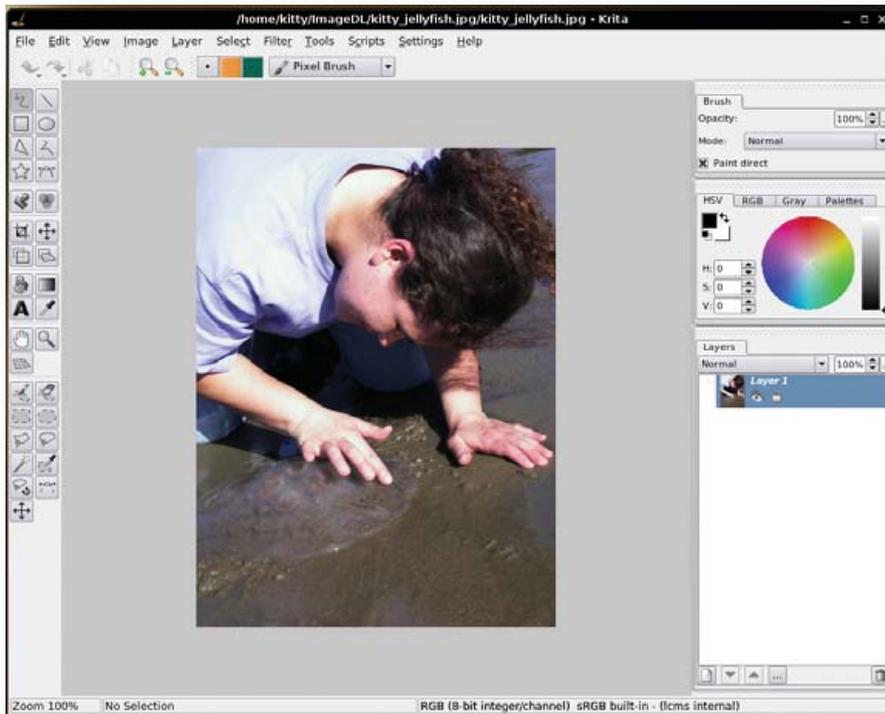


Figure 7. Krita's interface with photo loaded—notice the color management system is open by default in the upper right.

For graphics editing, there isn't such a clear winner. The field is dominated by two very robust contenders: Krita and The GIMP. I published an in-depth article in the July 2007 issue of *LJ* reviewing Krita and its advantages over The GIMP. The philosophies of the two programs are very different, as are the interfaces. The GIMP has a broader user base at the moment and more available plugins, and Krita offers more professional color

management and a broader array of basic editing tools. Currently, they're very different programs, and from the point of view of the lay user, a lot is going to boil down to personal taste in interface. Either will serve very well.

ENTERTAINMENT

Between Google video, podcasting, video podcasting, integrated DVD players and USB-powered...well, let's call them

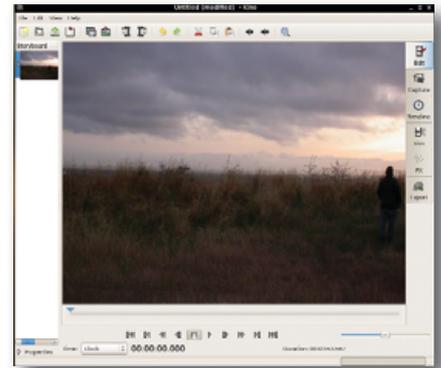


Figure 8. Kino's Main Editing Window

"personal exhilaration devices", the computer now is an entertainment center. Projects like MythTV let you literally build an entertainment appliance out of your PC, but even your desktop has to have a good multimedia backbone in it, or you might get frustrated and bored. We can't have that, now, can we?

So, let's start with home videos. You shoot them, and then what? Are you really going to spend months of your twilight years rewatching ancient DV tapes in real time? Of course not. But, you can edit them and export them to DVD or YouTube to share with your family if you install Kino on your system. Small, fast, feature-loaded and stable, it's the Linux answer to Windows Movie Maker and iMovie.

Of course, playing those movies you make and the DVDs already on your shelf, is another matter. You need a good, all-purpose media player. In Windows-land, you need QuickTime, RealPlayer, Windows Media Player, Flash Player and WinDVD to cover everything. In Linux, you need only one program, though you have a choice of three that are quite excellent: MPlayer, Xine and VLC. They all use FFmpeg as a back end, which is both highly robust and versatile. All three also can call upon Windows-native codecs to decode proprietary file formats. The choice between them primarily is one of taste. MPlayer can be run from the command line as well as with a GUI, it has a very stable Firefox plugin, and it contains an excellent set of command-line encoding and stream-ripping tools. Xine (and its front ends, like Kaffeine) tends to have the friendliest interface. VLC is equipped

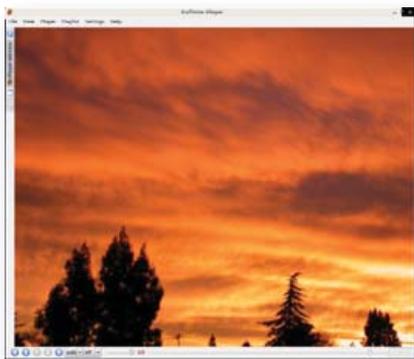


Figure 9. Kaffeine plays a video.

to broadcast Net streams as well as rip them and transcode them natively in the GUI. I personally keep all three around, but any one of them will do you well, depending on what you're looking for. In practice, you'll wind up using one for your viewing pleasure.

You'll also need a podcatcher and media library organizer and player similar to iTunes. In this field, AmaroK stands alone. It also allows you to select the back-end engine you prefer (GStreamer, Xine and so on) and will play pretty much any audio format under the sun. It includes integrated id3 tag editing, a very intuitive database index, a MusicBrains store interface and lots of fun little extras for dealing with iPods and other portable media devices.

Finally, you're going to need something to burn all the CD compilations, DVDs from videos you've edited, and backups of your data. The best and most fully featured solution you can get for this is K3b. It supports data CDs and DVDs to a variety of formats and standards, rewritable media, video CDs and DVDs, burning from a variety of ISO types, and even self-booting media CDs and DVDs with micro-operating systems (eMovix discs).

WRAP-UP

The good news about Desktop Linux isn't merely limited to the fact that you can do everything—or nearly everything—

Dan Sawyer is the founder of ArtisticWhispers Productions (www.artisticwhispers.com), a small audio/video studio in the San Francisco Bay Area. He has been an enthusiastic advocate for free and open-source software since the late 1990s, when he founded the Blenderwars filmmaking community (www.blenderwars.com). He currently is the host of "The Polyschizmatic Reprobates Hour", a cultural commentary podcast, and "Sculpting God", a science-fiction anthology podcast. Author contact information is available at www.jdsawyer.net.

on Linux that you need to do on a desktop system. The really good news is that most of these programs—Pidgin, OpenOffice.org, Evolution, MPlayer, THE GIMP, Firefox, GnuCash and VLC—work on Windows, so you

can ease yourself into the Linux/Open Source world in stages.

Is this the Year of the Desktop for Linux? That's something history will decide, if it even cares. But, one thing is without doubt: Desktop Linux has arrived. ■

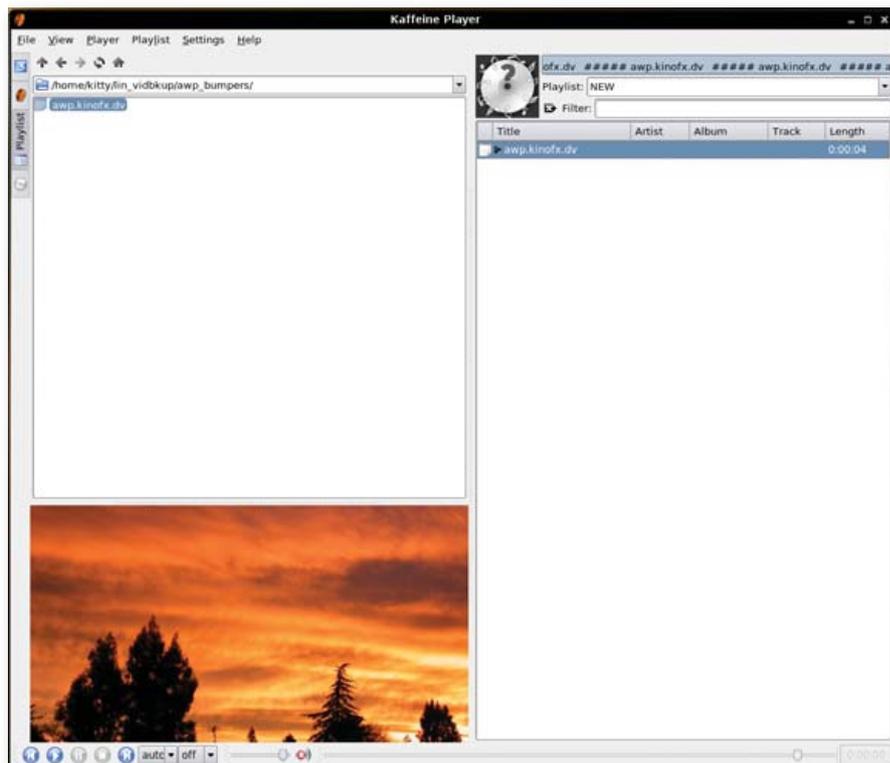


Figure 10. Kaffeine's playlist building interface, with a file browser on the left, a preview window under it, and the playlist on the right. Kaffeine is a Xine front-end.

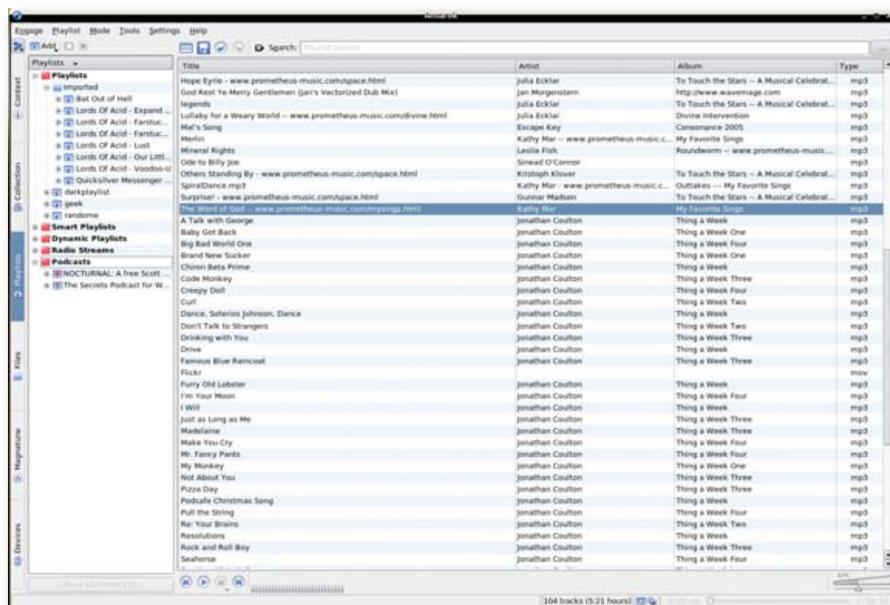


Figure 11. AmaroK is the ultimate podcatcher/portable media player/sync manager/music library manager/player.

BEHIND THE LOW-END LINUX BOX THAT SOLD OUT AT WAL-MART

Dave Liu of gOS and the \$199 gPC.

DOC SEARLS

In June 1996, *PC Week* ran a piece titled “Andreessen Eyes Internet OS”. Marc Andreessen was famously the prime author of the Mosaic and Netscape browsers, and a cofounder of Netscape as well. The money quote from that piece was, “The only difference technically between Netscape’s Navigator browser and a traditional operating system is that Navigator will not include device drivers.”

Needless to say, this and other remarks along the same lines did not please Microsoft. A great deal of history followed, including the “browser wars”, the sale of Netscape to AOL, the federal lawsuit against Microsoft, the dot-com crash, Y2K and much more. Forgotten in the shuffle was Marc’s original

ambition, which was to establish the browser as a platform, and in the process, to commoditize operating systems to the “bags of device drivers” they had long been called.

Now it’s 2008, and Google is busy treating the browser as a platform and is generally agnostic toward operating systems. (Its own services are mostly deployed on Linux-based systems, but its applications are either browser-based or made to run on multiple platforms. Google Earth is the ideal example. Picasa is not.)

But, the browser is mostly where Google likes to run user-side apps as Web services. In fact, Google now provides most or all of your basic desktop application suite—mail, office

(documents, spreadsheets, presentations), calendar and instant messaging—inside your browser. It’s up to the user which bag of device drivers runs between browser and iron. May the best bag win.

Thus, it was perhaps inevitable that somebody would come along and make a bare-bones—or bare-browser—box that’s optimized to run Google’s browser-based apps on the best-commoditized platform, fulfilling the Andreessen Prophecy.

That somebody is Dave Liu, the 21-year-old CEO of Good OS LLC. The company’s main product is gOS, an Ubuntu-based distro tweaked to run Web apps as if they were desktop ones. gOS might have been Yet Another Linux Distro had it not made news last



everex
gPC

everex
gPC

everex
gPC

Everex Green gPC
Specification

Does this network support
for your gPC and managed
gPC cases.

FEATURE Behind the Low-End Linux Box that Sold Out at Wal-Mart

November when the \$199 Everex gPC, running gOS, sold out in two days at WalMart.com.

Though the price is low-end, the gPC doesn't hurt for features. Here are the hardware specs, according to Everex: "1.5GHz, VIA C7-D Processor, 512MB DDRII 533MHz, SDRAM, 80GB HD Drive, DVD-ROM/CD-RW Optical Drive, VIA UniChrome Pro IGP Graphics, Realtek 6-Channel Audio, (1) 10/100 Ethernet Port, (1) DB 15-Pin VGA Port, (6) USB 2.0 Ports, (1) RJ-11 Port, (1) Headphone/Line-Out Port, (2) Microphone/Line-In Ports, (1) Serial Port, (1) Parallel Port, (1) Keyboard, (1) Mouse, (1) Set of Amplified Stereo Speakers".

Could this be the long-awaited starting point for Linux in the mass market? We thought it would be fun to catch up with Dave Liu in the midst of the buzz that followed the news. Here's the dialogue that followed.

Doc: So, what possessed you to create yet another Linux distribution?

DL: I'm actually fairly new to open source. Most of my work and studies at UCLA had been centered on Web 2.0. I saw a lot of great Web 2.0 applications that weren't taken seriously. You had to be the type of person to read TechCrunch, Mashable or other Web 2.0 blogs just to know they existed. Like open source, I felt we were developing Web 2.0 just for each other and not for the mainstream.

When I met the Enlightenment and open-source folks, I realized how we needed to work together. Together, I envisioned taking Linux and Web 2.0 mainstream. With Google backing both of these communities, I felt the best thing to do was to create a Linux distribution that made it easy for people to access Google and other Web 2.0 applications. This was how our communities could converge and help each other affect the mainstream.

We hope we will bring existing communities together, rather than simply start a new one. In fact, shortly after I met Enlightenment, we recruited some of its core developers to form our entire developer team.

Doc: Tell us more about Enlightenment. What does it do?

DL: Enlightenment is an X Window

System window manager. Like Compiz Fusion and other window managers, it's a graphical layer that sits on top of the Linux kernel. In the case of gOS, Enlightenment sits on top of a modified Ubuntu. Enlightenment was the ideal choice for gOS for a lot of reasons. Different from other window managers, Enlightenment enables gOS to run even better on the lowest-end hardware configurations. On the lowest-end hardware, the difference begins to show. That's where we see our advantage in today's market of expensive, high-end operating systems...Vista, Leopard. Enlightenment enables us to think about simplicity and affordability in a PC.

"THERE REALLY IS A GROWING SUBSET OF PEOPLE IN THE OPEN SOURCE COMMUNITY WHO CARE ABOUT CONSUMERS—PEOPLE WHO WANT TO MAKE THE LINUX EXPERIENCE PALATABLE FOR AVERAGE JOES."

Doc: How about licensing? What are the licenses involved for gOS, for Enlightenment?

DL: gOS is free for personal use and noncommercial distribution. Specifically, we're under the Creative Commons Attribution-Noncommercial-Share-Alike 3.0 Unported license. The majority of software we've aggregated in gOS is under the GPL license—such as Enlightenment, Ubuntu, OpenOffice.org and other open-source software.

Doc: Is Compiz in your plans for gOS? If so, how?

DL: At the moment, we have no plans to use Compiz Fusion. We'd like to establish our difference with Enlightenment. With the next revision, we'd like to ask the community for even more support in helping us develop EFL (Enlightenment Foundation Libraries)

applications that run in the Enlightenment environment. As of now, we're using a hybrid of EFL and non-EFL apps because our customers need a stable and full set of applications. For example, since we're launching gOS notebooks in Q1, we decided we had to tentatively replace our EFL-based Wi-Fi manager Exalt with Network Manager, because we were still seeing some problems with Exalt. In the future revisions, we hope to shift to all EFL-based apps so as to complement and make full use of Enlightenment.

Doc: Tell us about Faqly, and how you're going to interact with customers and users, as well as the dev communities.

DL: Faqly is people-powered tech support. It's a Web application that helps end users and developers help one another. It's been interesting to see our end users and developers interact and exchange tech support for user feedback.

Doc: We've read that you're offering a full year of 24/7 support. Is that true? What is the support policy overall, and how does it differ from competing offerings?

DL: It's true! Well, it's true for customers who purchase the Everex gPC. Wal-Mart requires PC companies to include toll-free tech support. Working with Everex and Wal-Mart enabled us to offer a full year of 24/7 toll-free support. That Everex supports open source with a toll-free support number is quite different from most other OEMs and their Linux products. Dell, for example, provides no support on its Ubuntu notebook. Initially, someone will pay the bill for getting open source to the mainstream users; we're glad that a smaller PC company like Everex is willing to lead the way.

Doc: Is this something for the low end, for the geeks or for geeks' moms?

DL: It's all those things—an ideal alternative, especially for a simple PC, something that works out of the box with the help of "the cloud" or Internet. We've also had a lot of people tell us they're excited about it, because they want to buy it for their moms or their dads, who don't need too much power and just want something simple, affordable and familiar.

Doc: But, it's still a Linux box, so the geek who's giving the gift can still ssh into it and help out if need be, right?

DL: It's definitely hackable. It's also good for someone who knows how to do customizing in general, or to work as-is. And yes, you can wipe it clean and install Windows if you like, but why would anyone want to do that? The gPC, in terms of components, assembly and the software combination alone is quite a deal.

The more important thing is where this is headed. I think we will soon see more companies invest their future in Web applications or "cloud computing". What we're trying to do is jump the curve and help make a way for others to do the same.

Doc: Where do you fit in the midst of these other distros?

DL: I'd see our role as something like Kubuntu's has been. Derivative, but taking some new directions to be more consumer-friendly.

Doc: What direction, for example?

DL: There really is a growing subset of people in the Open Source community who care about consumers—people who want to make the Linux experience palatable for average Joes. That's a big shift. And, that's whom we're appealing to. We felt that Linux as a native OS project is a great platform, but it still hasn't gone that final step to really connect it to consumers and to differentiate it from everyone else in the consumer space. To do that, you really have to bring a consumer aspect, and we saw that in Web 2.0—in Google apps and YouTube.

Doc: When you talk about Web 2.0 apps, you mean ones that work in a browser as a kind of Web service?

DL: Pretty much. We're basically talking about software that runs in a browser and is based on Linux. It's a paradigm shift away from the way you would typically use software. Instead of compiling and selling it, and having it run in the system, you're running everything in the browser. And, there's a lot of Web 2.0 software out there that hasn't gotten into the eyes of the public.

Doc: Examples?

DL: Even with the Google Docs—



spreadsheet, calendar—we were surprised at how people either had never heard of these things or had never tried them. We were among the first to put all the Google applications into one coherent package. So people could realize, going from one icon to another, that Google and Web 2.0 really are their computer. Not only that, but by comput-

ing in the cloud, users really are able to take their computer with them without taking their computer. As long as they can log on at a café or a friend's house, they have a computer of their own.

Doc: You don't generally think of desktops as being things that live in a browser. Are you abstracting the apps

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FEATURE Behind the Low-End Linux Box that Sold Out at Wal-Mart

and their icons out of the browser and putting them on the desktop?

DL: Yes. That's the idea. Users are accustomed to seeing applications in a dock or in a start menu. We want to stick with the easiest and most-familiar models for desktop computing, even if the programs are executed elsewhere. So yes, we're using a lot of Firefox shortcuts. From a tech view, it's a lot of browser shortcuts on a dock. All the main ones are in a dock, and a few more are in the start menu.

Doc: How about for documents you want to keep on your own machine to work on when you're off-line? Calendars, for example.

DL: We're still waiting for Gmail and Google Calendar to work off-line with Google Gears. In the meantime, we packaged off-line applications, such as OpenOffice.org, Mozilla Firefox and Thunderbird as well.

Doc: So you can do POP mail if you like.
DL: Exactly.

Doc: Or presentations that people might create on-line and then save to give off-line on their machine or transport by thumbdrive to another machine.

DL: Yes. Google has done a good job of balancing its products with open source. It just packaged OpenOffice.org into the Google Pack. With Google Gears, I think it's just a matter of time before we see every major Web application be capable of syncing and working off-line.

Doc: Are you in touch with the Google people on this?

DL: Yes. To be clear, the gOS is not the Google Operating System, although it is my idea of what one should be like. Even before we closed a hardware deal, I had used an obscure form on Google's Web site to apply for permission to use trademarks. I said, "Hey, we're an open-source OS project, and we want to make it easier for people to use Google apps, mind letting us use your icons and trademarks"? Two or three weeks later, we got a letter back, saying, "Yeah, go ahead, as long as you have a disclaimer saying this is not a Google product..." So we did it. We just didn't know we were going to get so much attention for it. When we started working with

Everex, we found that it had its own standard toolbar deal with Google. Then Everex also showed Google a preview of our screenshots. In that sense, there was "approval" from Google, but no official endorsement. We have friends at Google and keep in touch with them on both the gPC and the gOS.

Doc: The g in gOS stands for...?

DL: The g stands for good. Our mission is to make a good OS. Good for everyone. For example, we knew Microsoft to be a big, mean Goliath to work with for OEMs. We wanted to make an OS that could be a good friend to both consumers and OEMs.

Doc: What is your dev community like? Have you grown your own, in addition to the Enlightenment folks?

DL: Our core dev team is about seven people. We've added one or two in the last month. Once we got in the news, people starting hearing about us, and we have developers coming in from different communities. Some Ubuntu developers are helping out too. So we have a nice, little community going and growing. It's still early and what we call "controlled chaos". We're still trying to create a good structure so people who want to help can get started easily.

Doc: What's different about the community you see growing here?

DL: I think the younger generation of developers will include more Mac fans or Mac types. They're a bit more aesthetically inclined, more interested in the end-user experience. I see a future Open Source community that can take Linux further mainstream. Look at things like Compiz Fusion, Beryl—all that stuff. I had a chance to talk to Quinn Storm, the lead developer on Compiz and Beryl. She wanted people in the Linux community to make something end users could enjoy. After that conversation with her, I realized this was a growing community with a lot of promise.

Doc: Well, from an easy-to-use UI perspective, Apple has left the low end open. Do you see Linux making a move there?

DL: Yes. There are quite a few Linux themes that adopt some of the good things Apple has done on the UI. One remark I'd like to make on the low

end—I think Linux also got a fighting chance when Microsoft launched Windows Vista. Vista pretty much obliterated the low-end hardware experience for Windows. I've tried it, and it's a terrible experience. So, there's an opportunity at the low end in general, because Apple continues to be a luxury product and now, possibly to compete with Mac OS X, Microsoft vacated the low-end space as well. We're happy about that.

Doc: So what are your ambitions here? How do you plan to grow?

DL: We plan to expand our list of hardware partners in the US and abroad. One of our long-term ambitions is to be a real friend to OEMs and the hardware industry as a whole. We all know it's been tough to work with Microsoft, and we thought there was a business opportunity to serve OEMs as a "Good OS" company. We'll always continue to improve gOS in terms of design and performance, and we'll also continue to package new Google and open-source software that we think are relevant to people buying a computer. We intend to keep gOS extremely lightweight, so as to keep the overall hardware costs down. With all this coming together, another one of our ambitions is to help close the digital divide with affordable computing. There are many people in the world, some even in the US, who don't have access to a computer and Internet. We think gOS needs to work with Google, Web 2.0, open source and others to tackle this important problem.

Doc: How about laptops? Generic desktops are all the same. But laptops are all different, by design, through OEM partnerships with Microsoft. What are your plans there?

DL: One of the things that will make our laptops viable is software that offers seamless syncing on-line and off. You are going to see gOS on laptops very soon, if not by the time you read this.

Doc: Are you partnered with other hardware companies?

DL: Right now, we're working with Everex, a single hardware partner, but the goal is to expand to working with other companies as well. As a software company, we really appreciate Everex and expect we'll be working with it exclusively in the short term since this

launch. We are talking to a few hardware companies and are growing our team so we can work with more hardware partners.

Doc: I would think that Dell, Lenovo, HP and others would be looking at a Linux offering in the cost range that you're working in, at some point. Does that concern you?

DL: I think Dell was one of the big brands to launch a product, which is good, but among the smaller PC companies, Everex is still one of the top companies. It sells at Best Buy, Circuit City and Wal-Mart, yet it's small enough to be motivated to experiment and take chances with a company like ours. The larger hardware companies, such as Dell and HP, have a lot at stake with Vista, and with the Microsoft relationship. It seems to us that a company like Everex is less locked-down that way. So, we see companies like Everex taking the first steps that need to be made to take Linux mainstream.

Doc: You were just in China. What were you working on there?

DL: I went to an O'Reilly Foo Camp—a gathering of techies.

Doc: What was your takeaway from the Foo Camp there?

DL: We talked about Web 2.0 and open source in China. Things are exciting

because we're seeing the same kind of Web 2.0 and Linux projects successfully launch in China. It's exciting because China is in the very early stages. Only a small minority of its population is on-line, and that is already more than 110 million people. I think it's the second-largest on-line population to the US. There are huge opportunities there with Linux and cloud computing.

Doc: People have been waiting for this segment to open up for a long time, and I'm not just talking about the low end of the PC marketplace. I'm talking about the browser as the environment for all kinds of applications. Because, this is exactly what Netscape talked about doing way back in 1995. One of the reasons Microsoft came after Netscape was because Netscape had the audacity to say the real desktop on the Net will be the browser.

DL: The Netscape folks were super-advanced thinkers. I think it's going to be really exciting to see things unfold here. A lot of people have been saying Web 2.0 is a bubble, but I don't think so.

Doc: I've said it's what we're going to call the next crash.

DL: Yeah, I think it definitely would be without cooperation from hardware. But, what if hardware cooperates? It always takes hardware some time to catch up to software. Hardware companies soon will need to give Web 2.0 a serious look.

Doc: What's the next big thing?

DL: I think it's Linux finally rising up, up into the cloud with Google and Web 2.0. Then, a lot of these startups that we laughed at will find themselves front and center for what's next in computing.

Addendum

As this goes to press, the gOS-powered gPC sells at Newegg.com, Wal-Mart stores and ZaReason.com, in addition to WalMart.com. ■

Doc Sealts is Senior Editor of *Linux Journal*. He is also a Visiting Scholar at the University of California at Santa Barbara and a Fellow with the Berkman Center for Internet and Society at Harvard University.

Resources

gOS: thinkgos.com

gPC: www.everex.com/products/gpc/gpc.htm

gPC WalMart.com Listing:
www.walmart.com/catalog/product.do?product_id=7754614

David Liu's Blog: compiz.org

Compiz: compiz.org

Enlightenment:
www.enlightenment.org

EFL: www.enlightenment.org/p.php?p=about/efl&l=en

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KDE 4, first announced two years ago, is the next step for the popular UNIX desktop environment. With the shift to a new major version of the toolkit used to build KDE, developers are able to break free of requirements for compatibility and make radical changes to the codebase.

KDE 4 PREVIEW

Introducing KDE 4—the desktop revolution is coming. JES HALL



Qt 4

Qt 4 is a library for building user interfaces in C++. It provides most of the graphical elements of KDE applications.

Qt 4 heralds vastly better memory efficiency and a new painting system that is able to leverage new advances in X.org for previously unseen levels of eye candy. It also provides, for the first time, a GPL'd version of the library on Apple's OS X and Microsoft's Windows, making porting KDE applications to other platforms a possibility.

Plasma

The default desktop infrastructure, well remembered as operating on similar lines since KDE 2, is being completely redesigned. The new desktop shell, Plasma, promises to re-invent the desktop paradigm. Headed by Aaron Siego, Plasma's team of developers has been working on a complete replacement for the previous infrastructure of the KDE panel and desktop, and the results are breathtaking.

Plasma incorporates most of what is seen on screen at first login. It is a flexible, fully scalable and rotatable desktop shell with the ability to embed mini-applications and media as applets or widgets known as plasmoids. The concept of applets is not a new one to desktop design, but Plasma brings a few innovations to the table.

Plasma divorces the data engine from the presentation, allowing developers to write a data engine once and then present this in an arbitrary number of ways in an applet. For example, once

an engine to extract system performance state has been written, multiple plasmoids can present this information in different ways. A desktop plasmoid might have a large, detail-rich display, but the same data displayed on the panel might recognise its spatial constraints and display a simpler view.

Native Plasma applets can be implemented as containments, which are simply applets that can contain another applet. The panel is a containment, as is the desktop itself, and an applet contained within the panel can be dragged to the desktop or another panel, and vice versa, reforming and reflowing

itself to fit its physical constraints.

This flexibility opens up, among other possibilities, the ability for scalable displays to enable a content-rich desktop on a PC or a display that's more suited to low-screen resolutions on an embedded device. KDE 4.1 plans to support OS X dashboard widgets, hinging on new features in a release of WebKit scheduled for early 2008.

Oxygen

Oxygen is the name chosen for the cohesive look and feel for the new KDE desktop. As well as creating beauty, the Oxygen team of artists is working with



Figure 1. Plasma. Showing Some of the Included Plasmoids

FEATURE KDE 4 Preview

user interface guidelines to ensure that identification of elements is a priority. The result is a clean break from the previous KDE style, obviously inspired in part by already-existing artwork, but bringing it together with something fresh that is distinctly Oxygen's own. Oxygen also incorporates the system sound package, combining with the rest of the artwork to create something that is uniquely KDE.

With a team of three core icon designers, Oxygen relies on a set of strict style guidelines and an official colour palette to ensure a consistent result. The colours chosen are rich without being overpowering, and the icon design is modern and appealing.

An advantage of the new Oxygen icon theme is that it will be the first truly open KDE icon theme. The previous default for the long-running KDE 3 series, Crystal, never had its sources made available. The Oxygen team has been working exclusively in SVG, ensuring the set remains open.

The Oxygen style and window decoration is a large-scale departure from the Plastik style that became default in the late 3.x series. The muted pale gray and blue colours have made way for a brilliant off-white for both window decoration and controls. Green, orange and blue highlights are used sparingly with pleasing effect. The result looks extremely clean and modern, although such a large departure no doubt will draw some criticism. A wide range of colour schemes are available to suit almost every taste.

One minor concern about the new style is how much screen real estate it seems to use. We looked at KDE 4 on a Lenovo ThinkPad at 1400x1050 pixels, which seemed adequate for the task but by no means overgenerous. People still using 1024x768 or lower resolutions may struggle with the defaults.

A new wallpaper set has been collated, with the Oxygen artists acting as judges to select community submissions. The team chose 15 wallpapers, and the results are breathtaking. This kind of community involvement is unquestionably one of the strengths of the open-source development model.

Unfortunately, we were unable to preview the Oxygen sound theme properly—at the time of this writing, KDE 4 had not yet been released, and something about our sound card was causing the KDE sound system, Phonon, to crash.



Figure 2. The Oxygen Icon Set

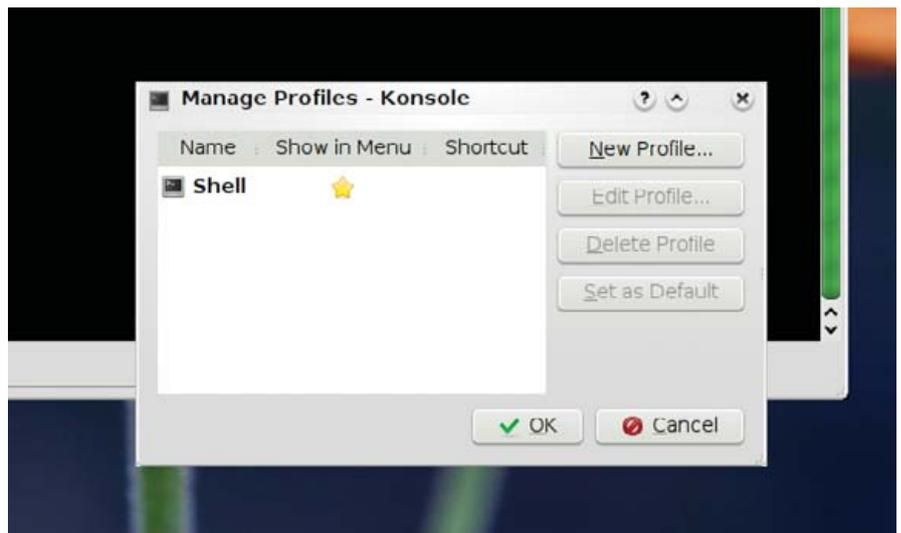


Figure 3. Oxygen uses bold highlights with low-contrast widgets to achieve a clean and modern look.



Figure 4. A Small Selection of the KDE 4 Default Wallpapers

Solid

Another core KDE 4 technology is the introduction of Solid. Solid is a library for hardware discovery, network and power management. It's an attempt to deal better with the ever-changing devices and connections of portable systems in our increasingly wireless world. Solid will integrate with popular frameworks, such as freedesktop.org's HAL and Novell's Network Manager, to leverage their features on supported platforms.

Solid implements graceful handling of off-line/on-line state for applications that use it. A Solid-aware e-mail client would, for example, know that you were off-line and not attempt to connect to your mail server if you opened it to check an older e-mail message or look up a contact while off-line.

Solid also includes a command-line utility called solidshell to manipulate its API for scripting purposes.

Phonon

Phonon is a sound framework that was

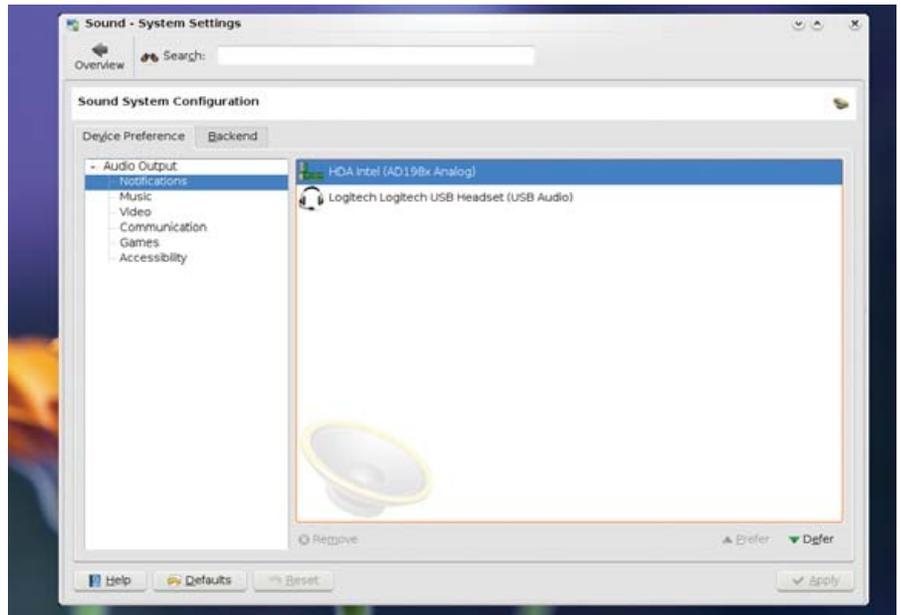


Figure 5. Phonon Settings Dialog

created to supply a stable and consistent API for KDE applications. It's capable of using a variety of engines as its back end and can switch between those engines on the fly. Phonon integrates closely with Solid to maintain awareness

of sound-capable hardware attached to the system. It's capable of per-application volume settings, grouped by category, and also is able to route different categories through different devices—for example, selecting to deliver a VoIP

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FEATURE KDE 4 Preview

conversation only through the headset and leaving the other system sounds to play through the sound card.

Phonon is written to be cross-platform, needing only a platform-specific engine as a back end to it. Along with the Xine back end that the KDE Project developed, the maker of Qt (Trolltech) has released Phonon back ends for GStreamer (Linux), DirectShow (Windows) and Core Audio/QuickTime (OS X) to be developed in KDE's source repository. Trolltech has stated its intention to include Phonon itself in Qt from version 4.4.

This is excellent news for the future of Phonon, signaling significant amounts of funded development time, as Trolltech will be maintaining the engines and contributing to Phonon.

KDE has long had a policy of leaving hardware support to the distribution. Although KDE 3.x has very basic support for removable storage devices with support for freedesktop.org's hardware abstraction layer, HAL, in the 3.5 series, many KDE installations have less than stellar hardware management due to the limitations of the distribution implementation. Whether it's correct or not, to many users, the desktop is the computer and their expectation is that it should handle their hardware well.

Solid and Phonon look to overcome these issues, leveraging what user-space support they find into as consistent an experience as possible for KDE users,

regardless of platform. Although the project has come under some criticism for creating Yet Another Abstraction Layer, Solid and Phonon make porting KDE to other platforms just a little bit easier. They also remove a lot of the complexity in dealing with hardware from most basic individual applications and keep it in a single place. Phonon isn't considered to be a one-size-fits-all solution, however; it's recognised that some applications may require more than Phonon's simplistic view of the world, like professional music editing applications.

Dolphin

Another major change for KDE 4 is the inclusion of Dolphin as the default file manager. Konqueror's file management abilities still will be available for the nostalgic or power user. Some of Dolphin's features include a "breadcrumb" style location bar and side panes for information and tree or bookmark views.

Dolphin as a project focuses on usability and simplicity. One of the larger benefits of including Dolphin is a long-sought-after separation of configuration between the Web browser and the file manager. A standing complaint among KDE users is the way that Konqueror's profiles mechanism doesn't achieve adequate separation between roles.

Rearranging the toolbars in one profile would affect another, and bookmarks were the same between the browser and the file manager. Possibly even

more confusing, clicking the Home button on the browser toolbar took one to the file management view of the user's home directory.

Although Konqueror is an exceptionally powerful and flexible tool, these configuration quirks were extremely frustrating to users who expected their file manager and Web browser to behave as separate applications. Not all flexibility is lost in the name of usability, however; Dolphin fully supports KDE's Kioslaves and Konqueror service menus.

There are myriad other changes to look forward to in the 4.x development cycle, but it would require far more space than is available here to detail them all. At the time of researching this article, KDE 4 was in a release-candidate state, with features still in a state of flux.

KDE 4 has been promising a desktop revolution, and it really looks as though it just might deliver. The first generation of new KDE technologies is shaping up to transform our expectations of what the Linux desktop should bring. When one considers that this is the state of the 4.0 release, and then looks at the length of the 3.x development cycle, the path that the evolution of the 4.x series will take stimulates the imagination. ■

Jes Hall is a Linux Technical Specialist and KDE developer from New Zealand. She's passionate about helping open-source software bring life-changing information and tools to those who would otherwise not have them.

TECH TIP Use Screen to Avoid Losing Remote Work

If you do much work on remote servers and have ever lost your connection at an inconvenient moment, using screen can help avoid losing work. Screen is, according to the man page, "a full-screen window manager that multiplexes a physical terminal between several processes (typically interactive shells)". Window manager may be a bit misleading, as it's not a window manager in the GUI sense, but rather it manages a number of full-screen console/shell sessions within a single console/shell.

Screen is simple to use; after you connect to the remote server, type:

```
$ screen -D -RR
```

This creates a new screen session if there isn't one or attaches to a previously created one if one exists. Now if your connection drops, you simply reconnect and enter the above command to reconnect and return to the exact point you were at when your connection was lost.

Screen has many keyboard commands for starting and

controlling additional sessions; see the man page for more info.

Screen also is useful when you want to execute a long-running process and don't want to stay connected while it runs. Simply start the command, and then switch to a different session and type `~.` to disconnect your SSH connection. When you return later, you can reconnect to the screen session and see the output.

You even may want to put the screen command in your `.profile` file so that it is started automatically when you log in. I like to have the option of not starting screen, so I have my `.profile` ask whether I want to start it:

```
read -p "Start screen? " ans
ans=$(echo $ans | tr A-Z a-z)

if [ "$ans" = y || "$ans" = yes ]; then
    screen -D -RR
fi
```

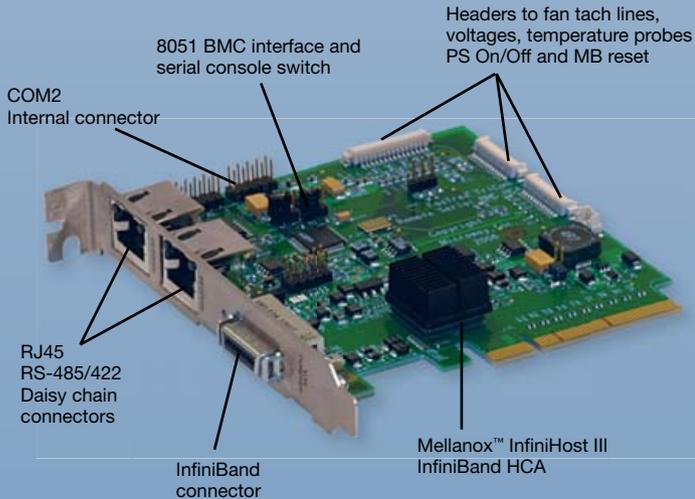
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Orca

TAKE THE KILLER WHALE FOR A RIDE

What is this ally thing
(accessibility: 11 letters
between the a and the y),
and how might people
access a complex graphical
desktop they can't see?

WILLIE WALKER

Orca is a free, open-source, extensible screen reader that provides access to the graphical desktop via user-customizable combinations of speech, Braille and/or magnification. In this article, I briefly discuss how to set up and use Orca on the GNOME desktop. This article's intended audience includes not only users with visual impairments, but also developers interested in improving the accessibility of their applications.

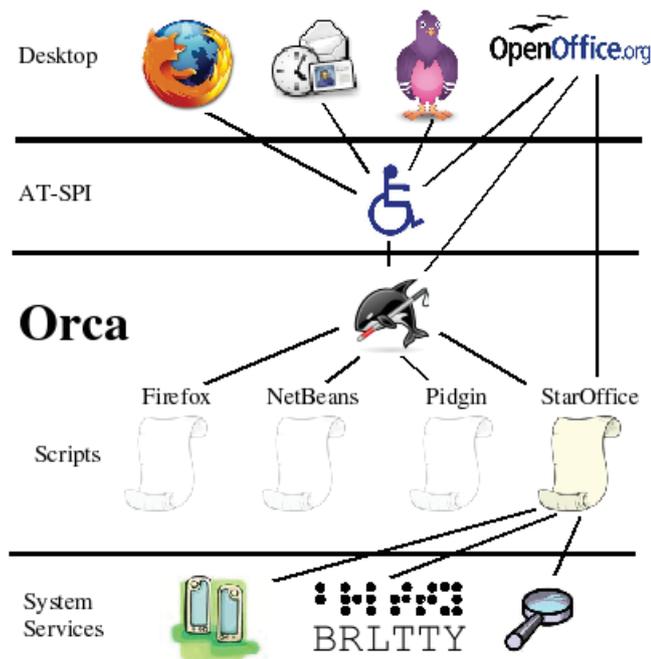


Figure 1. Orca Swimming in the AT-SPI Sea

Orca works with applications and toolkits that support the assistive technology service provider interface (AT-SPI), which is the primary assistive technology infrastructure for Linux and the Solaris operating environment. Applications and toolkits supporting the AT-SPI include the GNOME GTK+ toolkit, the Java platform's Swing toolkit, OpenOffice.org and Mozilla (KDE/Qt support for AT-SPI remains under investigation). As a result, Orca can provide access to applications, such as Firefox 3, Thunderbird 3, OpenOffice.org, most GNOME applications and a wide variety of multimedia applications.

Via the AT-SPI, Orca connects to applications and communicates with their graphical components, such as push buttons, text areas, menus and so forth. As you interact with an application, the AT-SPI notifies Orca. In response, Orca presents appropriate information to the user via speech synthesis (the machine talks to you), refreshable Braille (an external hardware device) and/or magnification (an enlarged view of the graphical display). Orca also provides mechanisms for you to explore the entire contents of windows presented by the application.

Orca is known as a scriptable screen reader, meaning it can provide customized behavior based on the application with which it is working. With Orca, custom scripts written in the Python programming language can be used to provide more compelling access to the unique interaction models of applications. For example, Orca provides a script for the Pidgin instant-messaging application to give you additional features, such as quickly reviewing the last few messages

that have arrived.

Note to application developers: Orca provides a default script that gives access to the majority of applications. As a result, a custom script is not required for each application. The Orca team encourages you to test your applications using Orca, however, and to create a custom Orca script if it is needed. The Orca team is happy to help you!

Prerequisites

In order to use Orca, you need a desktop environment that supports the AT-SPI, such as GNOME. Fortunately, GNOME is widely available on many operating system distributions, including Ubuntu, Fedora, Debian, OpenSUSE, Solaris Express and so on. Although Orca works on GNOME 2.18 and better, GNOME 2.20 or better are the versions in which Orca works best. Because Orca also is under constant development, the brave are encouraged to use the latest sources. See the "Downloading and Installing Orca" page of the Orca Wiki for more information on working with Orca sources.

To use speech, Orca currently uses gnome-speech to communicate with speech synthesis engines on the machine. On Linux systems, there are a variety of free, open-source engines available, including eSpeak and Festival. Most operating system distributions typically provide gnome-speech and at least one speech synthesis engine. To determine whether Orca can use speech on your machine, run the test-speech application provided by gnome-speech. If you can get your machine to speak using test-speech, it should work with Orca. See the "Speech" page on the Orca Wiki for more information on setting up speech on your system.

A typical Braille user will have purchased an external hardware device called a refreshable Braille display. These devices provide a number of Braille cells—typically 40 or so—where each cell comprises eight dots that a software application can pop up or down to create a Braille character. Orca uses a separate software application, called BrITTY, to communicate with refreshable Braille displays. Like gnome-speech, many operating system distributions install BrITTY by default. The configuration of BrITTY is outside the scope of this article, but more information can be found at the BrITTY site and on the "Braille" page of the Orca Wiki.



Figure 2. Refreshable Braille Display

```
Location: /tmp/foo.txt | $ |
```

Figure 3. Orca's Braille Monitor



Figure 4. Magnifier in Action

For application developers without a refreshable Braille display, Orca provides a graphical Braille monitor to present what would be sent to the Braille display. The Braille monitor is independent of BrITTY and also is useful for demonstrating Orca to other people.

Orca currently uses `gnome-mag` for magnification. As with `gnome-speech` and BrITTY, the operating system distribution includes `gnome-mag` by default. You can tell whether your machine has `gnome-mag` installed if the `gnome-mag` magnifier application is on your machine.

Setting Up Orca

When you log in to your GNOME desktop for the first time, the AT-SPI infrastructure typically is not enabled. As a result, Orca isn't able to provide access to your desktop. You can enable accessibility in a number of ways, one being the Assistive Technology Preferences dialog available from the GNOME Preferences menu. Assuming you can't see the display, however, this dialog is useless to you if accessibility has not yet been enabled.

To get started quickly with Orca, you can use the talking text-based setup utility: `orca --text-setup`. BrITTY users typically will run this from a virtual console. Below is an example of using `orca --text-setup` to set up Orca for use with speech and the Braille monitor:

```
bash-3.2$ orca --text-setup
Welcome to Orca setup.
Select desired voice:
1. kevin (en_US)
2. kevin16 (en_US)
Enter choice: 2
Enable echo by word? Enter y or n: n
Enable key echo? Enter y or n: n
Select desired keyboard layout.
```

```
1. Desktop
2. Laptop
Enter choice: 1
Enable Braille? Enter y or n: n
Enable Braille Monitor? Enter y or n: y
Setup complete. Press Return to continue.
```

If you have never done anything with accessibility on your desktop before, you typically will need to log out of your desktop session after running `orca --text-setup`. The desktop needs to be restarted with accessibility enabled. Once you have run `orca --text-setup`, accessibility is enabled for future logins to your desktop.

After you have logged out and logged back in, you can perform finer-grained customization of Orca's features using the Orca configuration GUI. The Orca configuration GUI is available any time Orca is running by pressing Insert-spacebar (desktop keyboard layout) or Caps Lock-spacebar (laptop keyboard layout) at the same time. You also can start Orca with the Preferences dialog by running `orca --setup`. More information on the Orca's configurable options can be found on the "Configuring and Using Orca" page of the Orca Wiki.

If you want Orca to start automatically when you log in, use the Assistive Technology Preferences dialog available from the GNOME Preferences menu. Press the Preferred Applications button in this dialog and navigate to the Accessibility tab. On the Accessibility tab, you can select Orca and also check the Run at start check box. Many users, however, merely run the `orca` command by using the Run Application dialog available via the Alt-F2 key binding on many distributions.

Using Orca

The Orca team refers to Orca's default operating mode as focus tracking mode. In focus tracking mode, you interact with any application (as any user would) using the built-in keyboard navigation mechanisms of GNOME. As you tab around the interface or interact with objects, such as pressing the spacebar to toggle check boxes or typing text into text areas, Orca presents the information to you via the combinations of speech, Braille and/or magnification that you have specified. That is, you merely interact with applications without needing to know any extra Orca keyboard commands.

Note to application developers: a quick sanity check for testing your application is to run Orca with speech and the Braille monitor enabled. Then, interact with your application using the keyboard alone. If speech and the Braille monitor seem to be updating with appropriate output as you interact with your application, you are doing a great job so far. If speech and/or the Braille monitor are doing unexpected things, such as talking too much or not presenting anything at all, you have some work to do. Fear not, the Orca team is willing to help you!

When you use an application for the first time, or if you just want to get a better idea of what is on the screen, you often may want to explore a window without changing anything inside it. This includes not even tabbing around the interface. As such, focus tracking mode may not always be useful, and you will need to use other features of Orca, such as flat review and where am I, that are controlled by key

bindings specific to Orca. When you press these key bindings, nothing happens in the application. Instead, Orca just presents the information you have requested.

For example, you might want to read the contents of a window line by line, word by word, character by character and so on. The flat review feature takes over the desktop keypad keys to perform these functions. For example, keypad 7 reads the previous line and keypad 9 reads the next line. The remaining numerical keys on the keypad perform similar functions for reviewing by word and character.

You also may want to know more detail about the object that currently has focus, the title of the current window, the contents of the status bar (if it exists) and so on. The where am I feature provides key bindings to obtain this information. For example, use the keypad Enter key to obtain information about the current object. When you press Insert at the same time as the Enter key, Orca presents information about the window title and status bar, if one exists.

Note on Orca key bindings: although the keypad keys are an exception, most of Orca's key bindings require you to press the Orca key at the same time as another key. This is much like how the Ctrl, Alt and Shift modifiers are used. The Orca key is a made-up modifier that can be bound to any key on the keyboard. By default, the Insert key is used as the Orca key for the desktop layout, and the Caps Lock key is used as the Orca key for the laptop layout. When Orca is used, the Orca key is owned by Orca and no longer behaves as a normal key.

The flat review and where am I features are only a few of the operations you can access via Orca's key bindings. For a complete list of Orca's key bindings, browse the Key Bindings tab of the Orca configuration GUI. In this page tab, you also can redefine the Orca key bindings to suit your specific needs.

Example: Accessing gedit's Open Files Dialog

Let's take Orca for a test ride and try a dialog containing components you might encounter in a traditional window: gedit's Open Files dialog. First, run the gedit application, which typically is found as the Text Editor menu item under

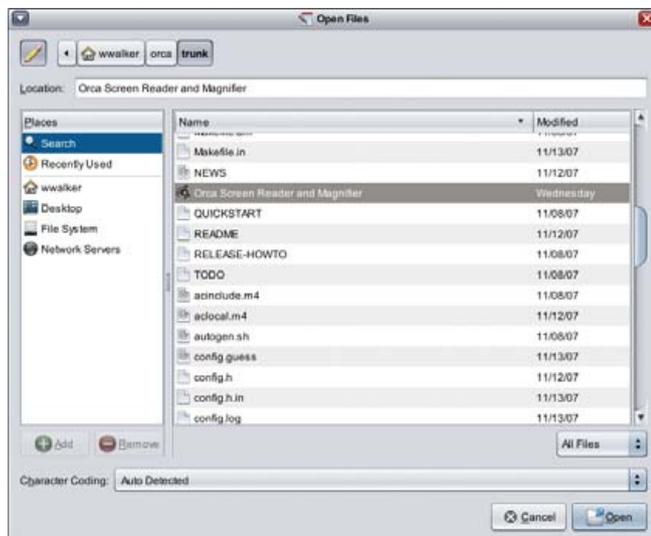


Figure 5. gedit's Open Files Dialog



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- 1X16 Port SATA-II Multilane RAID controller.
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Note to application developers: one of the main trouble areas for accessibility is forgetting to bind labels to the things they are labeling.

the Accessories menu. Then, press Ctrl-O to open the Open Files dialog.

When the Open Files dialog first appears, focus is on the text area labeled Location:. Orca automatically should present this information to you. With speech, you will hear "Location: text", which is Orca telling you the name, contents and role of the text area. As you type in this area, speech and Braille automatically should update.

Note to application developers: one of the main trouble areas for accessibility is forgetting to bind labels to the things they are labeling. The reason Orca knew to present the Location: label for the text area is that the gedit developers took care to set the L of Location as a mnemonic to get to the text area via Alt-L. Using mnemonics is not just useful for keyboard-only users, it also lets the accessibility infrastructure know there is a binding between the label and the text area. In the event a mnemonic is not something you can use, you can set the Label For and Labeled By properties on associated components using the accessibility properties tab in Glade.

As you arrow down through the file list, Orca presents each line to you. To get out of the file list, press Tab to navigate to the other objects on the page. As you do so, Orca

Resources

Orca Wiki: live.gnome.org/Orca

Downloading and Installing Orca:
live.gnome.org/Orca/DownloadInstall

eSpeak Speech Synthesizer: espeak.sourceforge.net

Festival Speech Synthesis System: www.cstr.ed.ac.uk/projects/festival

BrITTY: mielke.cc/brlTTY

Configuring and Using Orca: live.gnome.org/Orca/ConfigurationGui

GNOME Keyboard Navigation: www.gnome.org/learn/access-guide/latest/keynav-1.html

GLADE: glade.gnome.org

Orca and Firefox 3: live.gnome.org/Orca/Firefox

Orca Users' List: mail.gnome.org/mailman/listinfo/orca-list

presents information about where you are. Notice how the Character Coding label is presented when you tab to that combo box. Mnemonics and quality keyboard traversal are good friends to a screen reader.

Example: Accessing LinuxJournal.com Using Firefox 3

Now, let's try accessing the relatively rich Web page at linuxjournal.com. This will not only provide you with an example of accessing rich content with Orca, but it also will give you an idea of the power of scripting with Orca. The Orca team has worked closely with the Mozilla team to provide much better accessibility for Firefox 3. Orca's script for Firefox 3 also provides a number of custom mechanisms for accessing Web content. In this example, we'll demonstrate how a typical user might browse Web content.

Note: you must use the latest Firefox 3 nightly builds. See the "Firefox" page of the Orca Wiki for more information on obtaining the latest Firefox 3 nightly builds.

When you run Firefox 3, go to linuxjournal.com by pressing Ctrl-L and then typing the URL. Once Firefox loads the page, Orca should start reading it automatically. You can stop the automatic reading at any time by pressing any key on the keyboard.

At this point, you can tab around to focusable items on the page, such as links. There is much more important information on the page than links, however, and Orca's script for Firefox provides convenience mechanisms to get to the information.

Pressing the arrow keys gives you traditional caret navigation, but the Orca script for Firefox also provides more sophisticated structural navigation. Press O and Shift-O to jump to the next and previous "large objects" on the page. On linuxjournal.com, these happen to be the article summaries. You also can press H and Shift-H to move by header and L and Shift-L to move by list. The "Firefox" page of the Orca Wiki has more complete documentation on accessing Web content via Firefox and Orca.

Conclusion

This introduction should give you enough information to begin experimenting with the Orca screen reader, both as an end user or as a developer wishing to make your application more accessible. The Orca help facility, available via the Help button on the Orca main window, and the Orca Wiki provide much more information than can be covered here.

We also encourage users and application developers to join the Orca users' list. It is a list with a culture geared toward constructive and helpful comments. Much of the Orca user community hangs out and participates on this list. ■

Willie Walker is the lead of the Orca screen-reader Project and has been working in the X Window System accessibility space for nearly two decades. He is grateful to his employer, Sun Microsystems, Inc., for taking a leadership role in accessibility, and he also is grateful to the Mozilla Foundation for its continued support. Oh yeah, he loves his team and the Orca community too. Orca wouldn't be what it is today without all the people and organizations involved.

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EITAN ISAACSON



You might think you need to be familiar with assistive technologies like the Orca screen reader to determine whether your application is accessible. The truth is that with just a couple simple rules and an open-source tool called Accerciser, the task at hand is fairly simple.

Before you start diagnosing your application with specialized tools like Accerciser, you should ask yourself a few straightforward questions about your application.

1) Does my application's functionality depend on colors, icons or audi-

ble feedback?

Sometimes an application uses a certain color, graphical icon or sound as an indicator of its status or as a notification for users. A simple example is a battery-status panel applet; the applet warns users that their laptop battery is low by changing the battery icon from green to red. Of course, if users are blind, neither the green nor the red icon will be helpful if a textual description is not provided. Color-blind users also will be unable to decrypt such a status indicator. As another example, a calendar application may have an audible alert with no visual

indication when an appointment time is approaching. This, of course, would be a useless feature to people who are hard of hearing, or even to those who simply have their audio muted.

Such applications should offer alternative means of access to their features. Maybe a tooltip or label for the CPU monitor? Maybe an optional alert pop-up for the calendar program? These kinds of changes might not always be the perfect and most elegant solution, but remember, the line separating accessibility from usability is blurry and often nonexistent. The colored dot

on the CPU monitor might look nice by itself, but give users options as to how they can use your application.

2) Can users adjust the font size and interface color scheme in my application?

If your application utilizes a standard widget library like GTK+, the answer to the question above is yes. GTK+ is fully themeable. In fact, most Linux distributions provide a set of large-print and high-contrast themes to enable greater accessibility.

The question above should be examined seriously by ambitious developers who create a custom widget that is not provided by the toolkit. A good way to test a new widget is by applying an inverted high-contrast widget theme. Does the interface show up well? Is it conforming to the user-set widget theme?

Just like themes, most modern desktop environments provide a central place where the default font style and size can be defined. If your application is rendering text through the standard code path, chances are high that the font style and size the user defined globally will be applied to your application. But, what if your application explicitly defines font style and size? Or, maybe your application does specialized text rendering? In these cases, it is important to give the option for tweaking the font in your application.

3) Can my application be used without a pointer device?

Many conditions inhibit the use of pointer devices, for example, muscle weakness, hand tremors, involuntary movement or difficulty in seeing the mouse pointer on the screen due to visual impairment. For these reasons, it is important to enable nonpointer interaction with your application's features. This, of course, is easy to test. Disconnect your mouse and hide it where you won't find it. Use your application to ensure that you could reach and use all of your program's functionality. This also is a good time to think about useful keyboard shortcuts and mnemonics. Users will thank you when you make certain functions easy to reach without strenuous interface navigation.

4) Does the focus order in my application make sense?

Because you can't assume that users

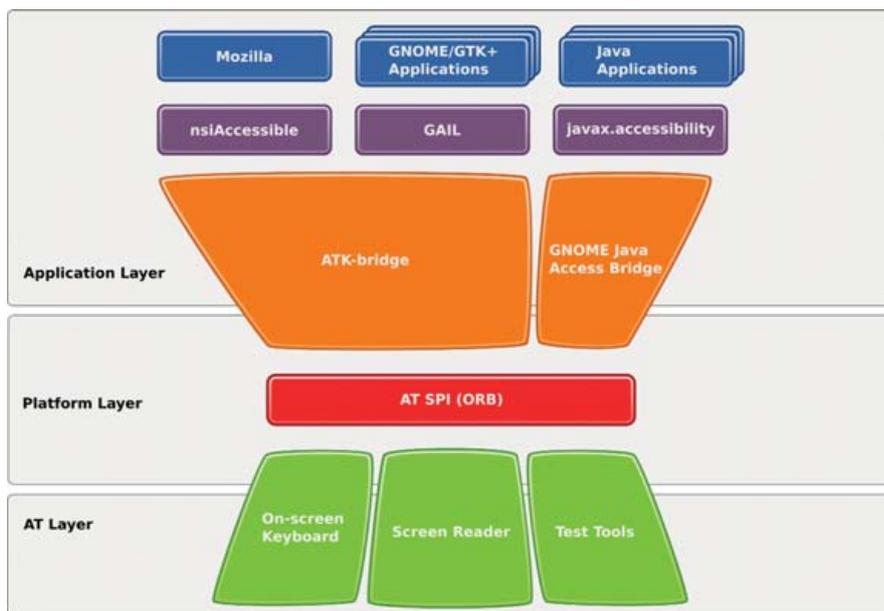


Figure 1. Desktop Accessibility Components

will be using a mouse, tabbing focus order should be considered. Remember the last time you bought something online? Most users fill out the order form by tabbing to the fields and typing: first name, tab, last name, tab, street address, tab and so forth. Wouldn't it be aggravating if, after you tabbed out of the name field, the Submit button got focus? Although sighted users might find this to be an inconvenience, screen-reader users will get a larger dose of confusion, because the work flow, when using a screen reader, is dictated by the focus order.

The visual appearance of your application does not need to change in order for it to have a good tabbing order. GTK+'s API has functions for defining the focus order of a parent widget's children.

The Plumbing

After you have asked yourself all of the above questions and provided satisfactory answers, it's time to see whether your application provides the proper instrumentation to assistive technologies, such as Orca. The functionality and state of your application are provided to the assistive technology through a CORBA-based framework called AT-SPI (Assistive Technology Service Provider Interface). From your application's side, the communication with assistive technologies is done with a library

called ATK (Accessibility Toolkit), which allows you to create Accessible objects that are synonymous with your graphical widgets.

In most instances, when you use GTK+, the accessibility internals should not concern you, because GTK+ has a module called GAIL (GNOME Accessibility Implementation Library) that does most of the heavy lifting for you. GAIL takes all of GTK+'s stock widgets and provides proper Accessible objects for them using ATK.

Accerciser, the Accessibility Exerciser

Accerciser gives a top-down view of what your application is providing regarding assistive technologies. It does this by tapping in to the same interface that an assistive technology would use, AT-SPI. Accerciser fits the needs of many different audiences. It is a tool used by assistive technology developers to see what AT-SPI is providing their applications, and it is used by automated UI test developers by exposing the different methods and events that could be expected from their target application when they author test scripts. And, in our case, it allows user interface developers to ensure that their application is providing all of its functionality through AT-SPI. In short, it allows us to exercise the accessibility of our application.

You can obtain Accerciser by

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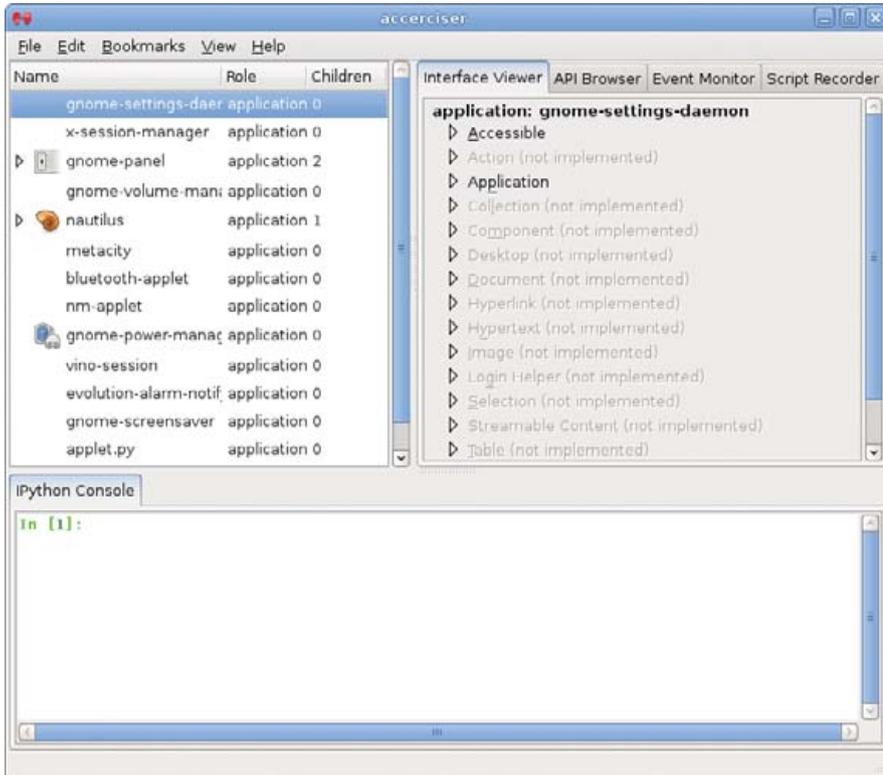


Figure 2. Accerciser's Main Window



Figure 3. Limelite Screenshot

downloading it from Accerciser's Web site, or check your distribution to see if it is already packaged.

Accerciser consists of a fairly small core. Most of Accerciser's features are in its bundled plugins. Accerciser's main window has three major areas: a tree view of the entire desktop accessible hierarchy as exposed by AT-SPI's registry, and two tabbed plugin areas.

Accerciser's plugins can be toggled and rearranged simply by dragging the plugin tabs: drag a tab to another plugin area to move the plugin to that view, or drag the tab over the desktop to create a new window with a plugin view in it.

An easy way of diagnosing our application is with the Interface Viewer plugin. Accessible objects could expose a wide range of func-

tionality by providing more than one interface type simultaneously.

The interface viewer plugin allows users to explore the functions a selected Accessible object provides. We use this plugin below to examine a fictional application.

Limelite, an Imaginary Application

So far, it seems that we get everything we need for our application's accessibility for free just by choosing GTK+, right? We have theme compliance, we have keyboard navigation, we even have AT-SPI support. So, where could we be falling short of full accessibility?

First, let's create a fantasy application called Limelite. Limelite is a simple song-playing program with one killer

feature: by pressing a toggle button in the GUI, the vocals are magically removed from the sound output, and the user, for a few minutes, could be a rock star.

Limelite's main window is divided in two. The top shows data about the currently playing song, and the bottom has common media controls (play, pause, next and so on) and a toggle button that enables or disables karaoke mode.

To examine Limelite through Accerciser, all we need to do is run both programs. Limelite's top accessible node will appear in Accerciser's tree view. As we traverse down through this node's descendants and select child nodes, we will get a flashing rectangle around the equivalent widget of the selected accessible node. When a node is selected, the plugins will update and show information about the currently selected Accessible object.

Labels

When you spend time designing an application's interface in a visual manner, issues like proper labeling often are overlooked. We use Accerciser to find such instances quickly.

Accerciser comes with a plugin called Quick Select. Put the pointer over the widget you want to examine, say the Play button, and press Ctrl-Alt-/, the button is highlighted, and Accerciser's tree view shows the Play push button as selected. Because the Accessible's name is Play, we can be certain that an assistive technology will not have trouble conveying the function of that button.

Limelite's multimedia keys are all GTK+ "stock" labels. Stock labels are a pool of commonly used labels that GTK+ provides. It is always a good idea to use these labels when possible, as they will provide a localized string and a themeable icon in most cases. For this reason, stock labels usually are safe from an accessibility standpoint.

The one key that should concern us here is the karaoke toggle mode button. This button contains nothing but a microphone graphic. If you select it in Accerciser, you will notice there is no string representation present. A good place to double-check is in the Interface Viewer, under the Accessible section. Here, you can see there is no description for the Accessible either.

This situation easily can be ratified

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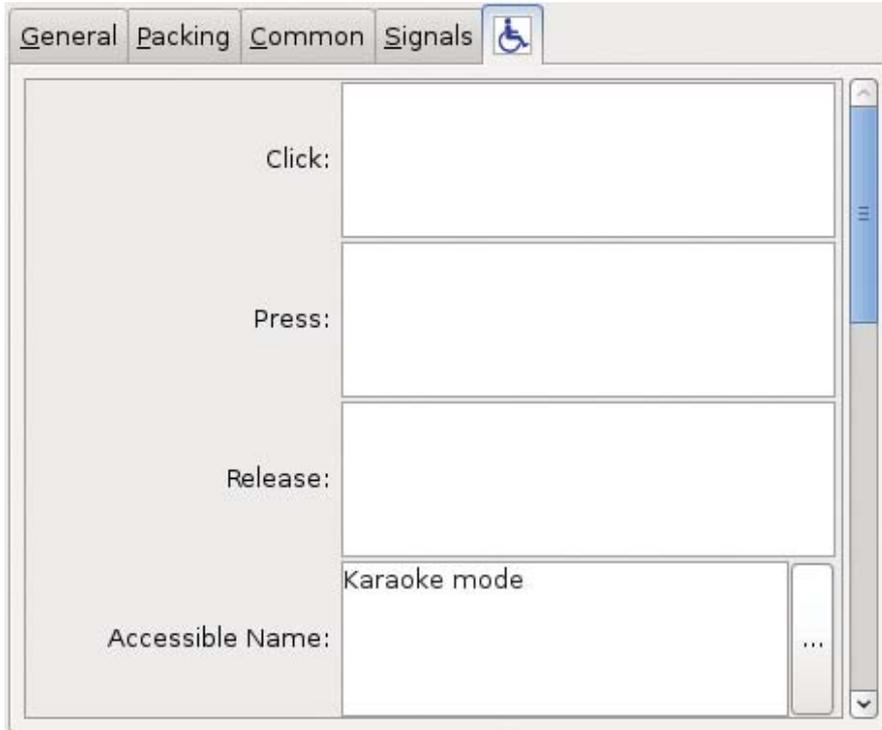


Figure 4. Glade-3's Accessibility Tab

by directly naming the Accessible object through ATK's `atk_object_set_name()` function. If your UI is defined with Glade or GtkBuilder, you should be able to set the Accessible's object name in the Accessibility tab.

Of course, the above solution will not make your interface any more clear to a user without an assistive technology. A tooltip would be a good choice in this case, both for general usability and accessibility. When a tooltip is set for a widget, GAIL automatically uses the tooltip's text as the Accessible object's description string. Assistive technologies could utilize this description string.

Relationships

When sighted users see Limelite's UI, it is obvious to them what the relationship is between the labels. For example, it is clear that the Artist label denotes the fact that Edith Piaf is the performing artist of the current track. This is clear because of the table-like spatial layout of the labels: on the left are the field names and on the right are the field contents.

A screen reader will have trouble conveying this relationship between the two labels to blind users. AT-SPI exposes all of these labels as a flat collection, and GAIL has no way of automatically determining

the labels' relationship to each other.

For this reason, such relationships need to be defined explicitly by the application author. If the application's UI was defined via Glade or GtkBuilder, we could easily declare the proper relationships in the Accessibility tab in each label's properties. If our user interface is written pragmatically, we will have to use ATK's API.

With Limelite as an example, the label containing the Artist string needs to have a "label-for" relationship with the label holding Edith Piaf, and the Edith Piaf label in turn needs to have a "labeled-by" relationship with the label holding Artist. Similar reciprocal relationships need to be defined for the Title and Album fields.

Finally, in the Accessible section in Accerciser's Interface Viewer plugin, we



Figure 5. Label Relationships

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Figure 6. Relations as Seen in Accerciser

could verify that the defined relationships are coming down the wire and are provided to the assistive technology.

Conclusion

It is hard to separate usability from accessibility; more often than not, the two terms are synonymous and require your sound judgment. But, if you keep a few simple principles in mind, developing an accessible application is an easy and straightforward task. Tools such as Accerciser allow you to review your program's interface from the assistive technology side and make informed choices in interface design. ■

Eitan Isaacson currently lives in Seattle, Washington. Eitan is a regular contributor to Orca and is the developer and maintainer of Accerciser. Eitan's passions include sipping high-mountain oolong tea and talking politics.

Resources

Accerciser's Web Site: live.gnome.org/Accerciser

GNOME Accessibility QA: developer.gnome.org/projects/gap/testing/index.html

Keyboard Navigation for GNOME: developer.gnome.org/projects/gap/keyboardnav.html

ATK API Documentation: library.gnome.org/devel/atk/unstable/index.html

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LPI www.lpi.org	27	THE PORTLAND GROUP www.pgroup.com	25
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Multitrack Video Editor Roundup

Video editing in Linux can be hell, but a handful of programs are showing the way forward to a better world. DAN SAWYER

In the January 2006 issue of *LJ*, I wrote an extensive article surveying the state of the art in video production software on Linux. At the time, there were a lot of new players, some brought into the field from the first Google Summer of Code, and very few of them were serviceable all the way around.

The intervening years have done their Darwinian work, with some projects maturing rapidly, others stagnating and others being abandoned or disappearing off the Net altogether. But, as Nietzsche noted (or would have if he were as interested in software as he was in philosophy), "What doesn't kill a project, makes it stronger." This article is about the survivors. Few though they are, some have managed to thrive.

Video editing on Linux always has been curiously bifurcated. On the one hand, there are glorious high-end finishing packages, such as Discreet Smoke, that are used routinely on big-budget productions, but the price tag for a single Smoke system runs into the tens of thousands of dollars, so it's not particularly budget-friendly. On the other hand, there are excellent low-end packages, such as Kino, which handles DV with grace, speed and polish. The middle ground between them is littered with half-finished projects, failed projects and Cinelerra, a behemoth that is both finished and polished but can be said to "work" only in the sense that a horse with five legs might learn how to walk.

That is changing.

There is nothing, in theory, stopping an open-source video editor from offering the basic functionality of a Premier or a Final Cut Pro, together with the switching ability of a product like Casablanca to produce very quick edits of multicamera shoots. Cuisine, in fact, was developed with this ability

in mind, and even though it got only halfway there before it was abandoned, several of the innovations it used toward that end could be instructive. Some of the projects here already are well on that road.

The Main Contenders

The Linux multitrack field is now dominated by three programs that have been going gangbusters on development. All of them are not only still standing but also are proceeding at a meteoric pace—and in a promising direction: Jason Wood's KDENLIVE, Richard Spindler's OpenMovieEditor and The Blender Foundation's Blender.

KDENLIVE

KDENLIVE (the KDE Non-Linear Video Editor) is the project that has garnered the bulk of my ink thus far (I reviewed it

in-depth in the September 2007 issue of *LJ*), mostly because it has been a clear leader for quite a long time. It was the first multitrack in the current crop to attain usability.

Pioneered by Jason Wood and now maintained by a team of developers, KDENLIVE is a Qt-based editor that uses FFmpeg as its decoding engine and Dan Dennedy's MLT as its frameserver and EDL backbone. It's a powerful combination, putting it into a position to handle HD as easily as garden-variety DV, and opening up its importable profile to include pretty much any video format you can watch on a Linux box.

The interface is laid out much like that of the late MainActor. It's familiar and easy to pick up, and if you're like me and really hate this paradigm, you can undock the interface components and reconfigure them until your picky

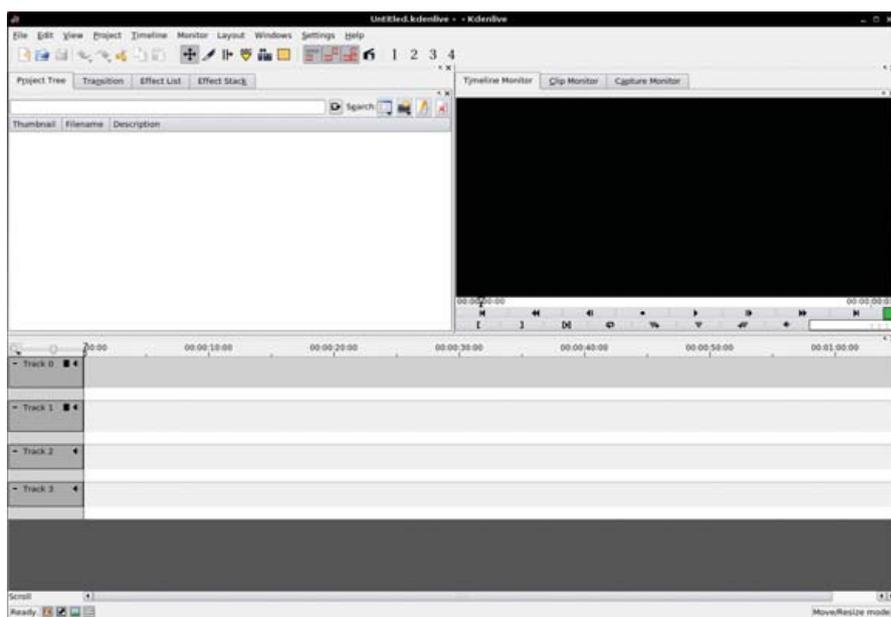


Figure 1. KDENLIVE's default interface resembles early versions of Premier or MainActor.

little heart is content.

The underlying MLT framework supports infinite audio and video tracks, and there are a healthy number of built-in video and audio effects (although extensive keyframing remains problematic at the time of this writing). Its interface sluggishness mentioned in my prior review largely has been solved, as have the difficulties working with interlaced footage when scaling. The titler subsystem now works and is very nicely compatible with installed TrueType fonts and a wide variety of raster graphics formats.

All of this is great, but it doesn't amount to a hill of beans in this crazy world if it can't perform. That's where the drawbacks show up. It's still fairly crash-prone, and the current migration from FFmpeg as the frameserver to MLT has broken a few things relating to a/v synchronization with NTSC footage. These are known issues due to MLT bugs, which are, at the time of this writing, being fixed (and hopefully will be fixed by the time you read this).

There is still a way to go in a couple of areas. Its audio toolkit is rudimentary, but its easy exporting dialogue-splitting means you can split the audio and push it over to Audacity or Ardour for sweetening once your edit is done.

The export GUI also presents a problem. As extensive as it is, it isn't friendly for creating new profiles, which means that you have to hand-tweak scripts or wait for new profiles if you want one that doesn't happen to come prepackaged. Fortunately, the plethora of profiles is quite staggering, including a wide range conforming to all the current HD broadcast standards.

The final weakness—and the most annoying to me personally—is KDENLIVE's lack of support for importing image sequences. It's something that should be axiomatic in a system using FFmpeg as a back end, as FFmpeg is an excellent manipulator of image sequences and Bash has wild cards for such things built in. This alone bumps KDENLIVE out of the professional space, but with this exception, it is a highly promising work in progress, stable enough to use so long as you don't mind pressing Ctrl-S fairly frequently.

Its most irritating issues are pretty much solved, and I've used it to complete several short and long-form projects. It's perfectly serviceable for day-to-day use if you know your way around your footage.

KDENLIVE is the only product in this roundup that supports video capture.

Here's hoping the development team keeps up the excellent work!

OpenMovieEditor

OpenMovieEditor is the brainchild and personal hobby of Richard Spindler, and it's generally stable, fast and usable. It supports the full range of framerates and allows for the creation of pretty much any working profile, and it sits partly—though by no means exclusively—on FFmpeg with all the glorious format compatibility that this implies.

The work flow is pretty much what you'd expect, with the interface closely

mirroring what we've come to expect from KDENLIVE and similar projects. Unlike KDENLIVE, the interface is not easily reconfigurable. However, because it's built on FLTK, it's fairly rock-solid. It doesn't crash, it's fast and light and doesn't bog down due to fancy widget rendering. The resulting look is fairly inhospitable cosmetically, but you don't need rounded corners and crystalline widgets when you have a program that stays up like a truck and speeds along like a Trans Am.

HD compatibility is no problem; OpenMovieEditor is profile-agnostic. If FFmpeg or libquicktime can read it, you can use it, and it's always obvious what's compatible because it shows up with a thumbnail in the media browser tab.

The development philosophy under which Spindler has proceeded leverages the power of the Open Source world to

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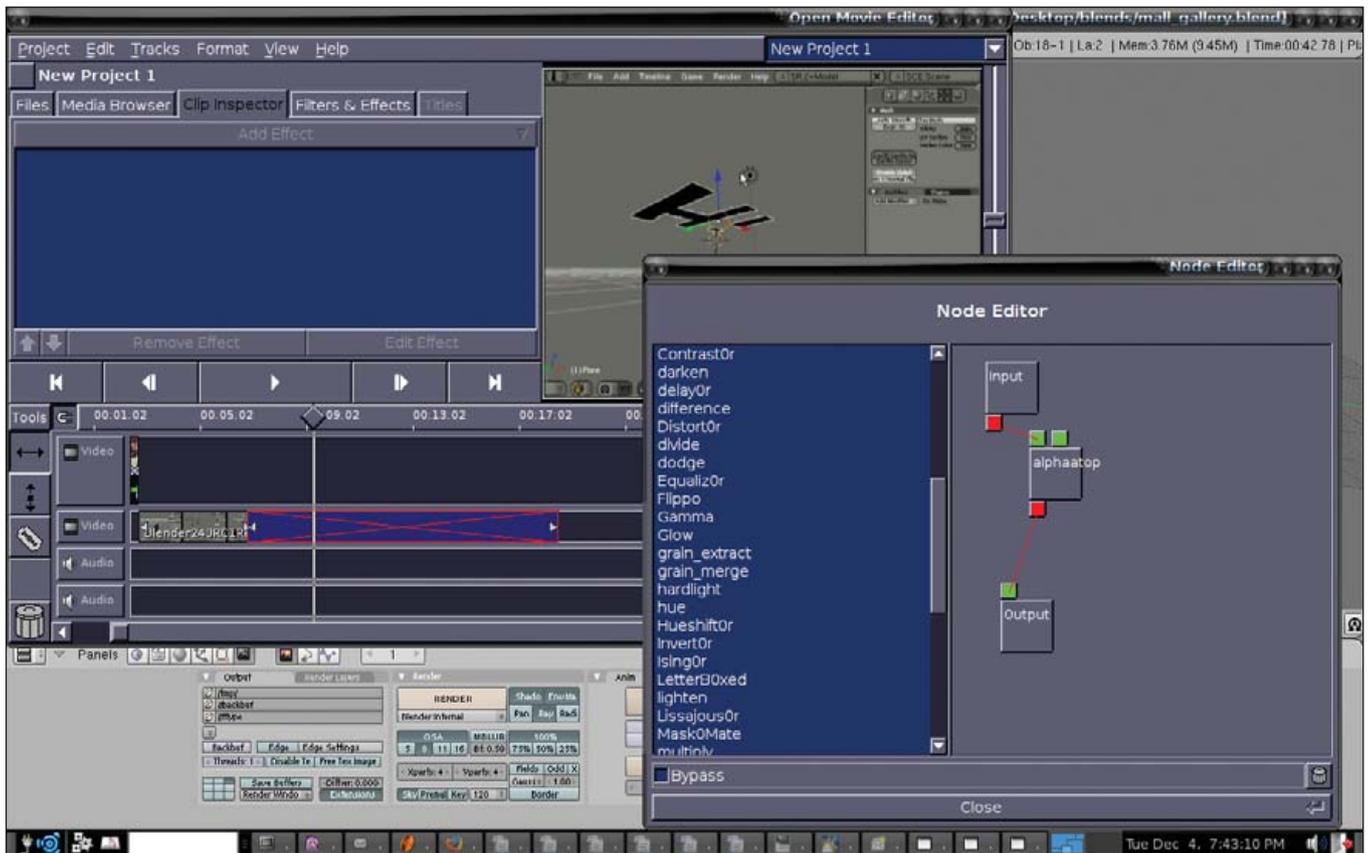


Figure 2. OpenMovieEditor's FLTK interface: the editing tools are all embedded right in the interface next to the tracks, and the nodes editor for the compositing subsystem is visible at bottom left.

his project's advantage. When I interviewed him for background for this article, he told me that, behind the scenes, he is involved in several external video projects that he uses to advance OpenMovieEditor, building on a suite of highly stable external libraries: gavl, libquicktime, the Frei0r plugin API, JACK and several others. All of these things extend the package considerably, with Frei0r being of special note as the primary source for the video effects. Spindler himself is involved in Frei0r, libquicktime and Cinelerra development in varying degrees, which gives him the familiarity he uses to integrate their best tricks into his own project.

He has used it to stunning effect. The audio and video effects in OpenMovieEditor work splendidly, although many of them could use more settings controls to move them into a more professional realm. The latest addition to his bag of tricks though is a

major step in the right direction and something hereto unheard-of in the realm of open-source video editing packages: nodes-based compositing, which can use all the installed video effects (although Blender also has a nodes-based compositor, its interface with the video editor is oblique and patterned more after the fashion of a finishing system than a video editor).

OpenMovieEditor is unique among Linux multitrack editors in that it is capable of running its audio through the JACK Audio Connection Kit (JACK). This gives it access to *all* the excellent, readily available Linux pro-audio tools, and with proper kernel patching it works in real time. The upshot is that you can use OpenMovieEditor as part of a sync chain that will allow you to create, compose and tweak your soundtrack while always seeing the video and hearing the audio as it's mixed. It's hard to overstate the power of this; it is

unambiguously a professional feature, and it's a great benefit to independent filmmakers and small studios who need the performance it offers and aren't able to buy the higher-end turnkey systems on offer for the film industry. But Spindler isn't done—he and his community members are working on integrating the system with Inkscape and with Blender for generating new transitions and other effects. The future on this seems bright!

When it comes to asset management, the program seems, at first glance, not much different from KDENLIVE. Looks are deceiving though—it's much more flexible. When it comes to open-source projects, OpenMovieEditor's asset management system, which allows clips to be stored in a bin off the timeline for grabbing and inserting, is a work-flow tweak that makes shot selection independent of the status of the edit, and also makes

assembling the selected shots far quicker. With its ability to set clips in the use bin rather than whole files, its ability to use image sequences and its thumbnail filesystem browsing, it is far above par, and much more sensible than what's available for asset management in KDENLIVE or Blender.

One caveat that Spindler gave me when I interviewed him via e-mail:

OpenMovieEditor is very much a work in progress; this means that it is not yet feature-complete, but that it has a rapid pace of changes; development is happening rather fast, and not in a very "controlled" fashion. So, it might happen that stuff that worked once can break, or that new features are not as well tested as they should be.

So, it's a wise procedure, when upgrading OpenMovieEditor, to test fresh compiles thoroughly before installing them, or at least to keep around an older package you know to be working to revert to should there be problems.

In sum, OpenMovieEditor is an excellent package all around and well worth the time investment in learning it. It lacks the plethora of export profiles offered by KDENLIVE, but it makes up for this with a well-appointed, intuitive GUI that allows experienced editors to specify their own export settings for pretty much any destination or mastering format supported anywhere under Linux. It goes further, supporting high bit-depth editing, effects and export with integrated (though still primitive) nodes-based compositing. This is a project with nowhere to go but up.

Blender

Blender is justly and primarily famous for its standing as the premier free/open-source 3-D graphics package, but that's not all it can do. Because it is intended as an end-to-end finishing system for animation, it has integrated a full-featured, OpenGL-driven video editor called the VSE (Video Sequence Editor).

The VSE is, to say the least, pretty

strange. Like all things in Blender, the interface is built for efficiency and speed of use over user-friendliness, so the learning curve is a bit steep, although knowing a good bit about how the rest of Blender works will help out handsomely.

Blender's major shortcomings to this point, as a video editor, have been threefold:

- As it started life as an animation editor, it hasn't had support for fractional framerates such as are found in NTSC (29.97), which causes sound sync problems when editing NTSC footage with sound. This is now fixed in CVS, and with any luck, it will be in the next main release before this article goes to press.
- Its export paradigm is obtuse and hard to cope with, setting an entry bar too high for most editors to be willing to consider. A bit of practice makes this a non-issue.
- It also has no asset management system—all that work has to be done outside the program by editors carefully structuring their directories and assets if they care to keep track of everything. This probably never will be addressed—thus far, there isn't a significant cry from within the user community to change it, and I suspect it would take some nontrivial code refactoring to pull it off.

However, despite these initial weirdnesses, Blender's VSE has a lot to recommend it, not the least of which is its easy integration with the other parts of Blender. It can accept as inputs both rendered and unrendered strips from the animation subsystem and the compositing subsystem—a very powerful bonus. The compositing system itself (reviewed in the November 2007 issue of *LJ*) is a full-fledged professional nodes-based system that goes far beyond the video effects available in any other Linux editor. Additionally, Blender's VSE is itself a layers-based compositor, with quite a few native and community-generated plugins for color correction, greenscreen compositing, PIP

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work and so on.

In practice, this means that, when properly used, Blender's VSE has, by one path or another, all the power of After Effects (sans easily usable rotoscopes),

particularly for plane-based animation, a trick I use regularly to design animated DVD menus. It also has a professional color-correction tool that is totally absent from the other editors in this

article, a vectorscope.

For format compatibility, Blender shares the FFmpeg backbone with KDENLIVE and OpenMovieEditor (initially integrated into Blender by Ian Gowen as a Google

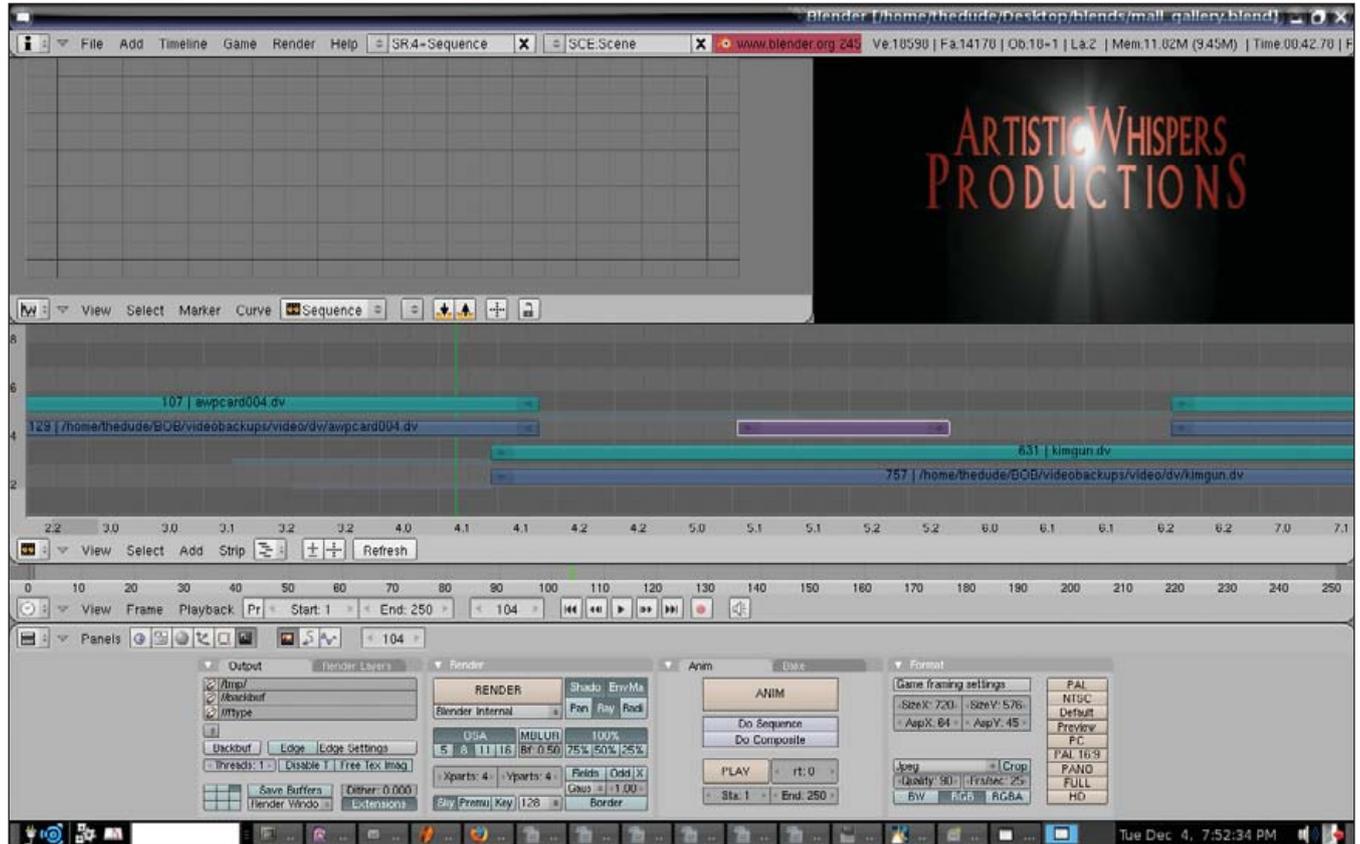


Figure 3. Blender comes preconfigured with a video editing screen setup. Video files are in cyan, sound in blue, and image sequences are in purple, so you can tell at a glance what you're working with.

TECH TIP Getting X Window System Information

You may have wondered how to determine certain X attributes using simple shell commands, such as the refresh rate and display resolution. You can use `xrandr` for that purpose:

```
$ xrandr --verbose
```

```
SZ:      Pixels      Physical      Refresh
*0      1024 x 768      ( 333mm x 241mm ) *85
1       800 x 600      ( 333mm x 241mm ) 85
2       640 x 480      ( 333mm x 241mm ) 85
Current rotation - normal
Current reflection - none
Rotations possible - normal
Reflections possible - none
```

You also can get a great deal of information with the `xpyinfo` command, such as finding out what extensions

are supported by the X server:

```
$ xpyinfo | less
```

One very useful extension for video is the Xvideo extension, known as xv. The `xvinfo` command can give you information on this extension:

```
$ xvinfo
```

For 3-D, use the `glxinfo` command:

```
$ glxinfo
```

For more information about these commands see the respective man pages.

—GIRISH VENKATACHALAM

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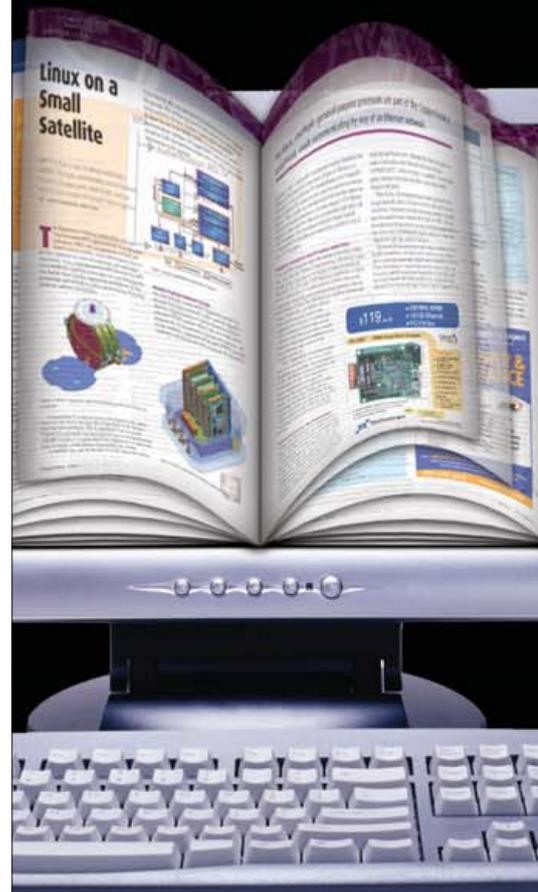
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SoC project), and it deals excellently with image sequences (which is only natural, as it was originally an animation editor). Its audio compatibility also is FFmpeg-based, and although Blender's audio tools are paltry to the point of vanishing, it is quite suitable for video editing where a separately mixed soundtrack is conformed to the video in the VSE.

Like OpenMovieEditor and unlike KDENLIVE, Blender's VSE is format-agnostic—the final output profile being controlled by the output settings in the RenderButtons window.

Alas, Blender VSE has one more shortcoming: unlike KDENLIVE or OpenMovieEditor, it has no option for direct stream copy to prevent generation loss when rendering out to the same format you are using for your source footage. If you're using Blender as a finishing system, this isn't an issue; most of your footage will have effects applied and thus be recompressed on export anyway.

I personally don't use Blender as my primary video editor, though I have found myself using it more and more as a finishing system and may give it a go doing a full project on it sometime in the not-too-distant future. It's an odd mix of best-of-bunch and worst-of-bunch, which might not seem like a glowing recommendation, but it is an indispensable tool for a Linux production pipeline.

Detritus

Of course, there are a number of projects I haven't mentioned here. Without exception, they are all unusable. They either haven't achieved usability yet (Pitivi and Jahshaka), they are poorly designed, unstable and resource-hungry (Cinelerra), or they are dead on the vine (MainActor and Diva).

Conclusion

One of the great weaknesses in open-source software in the video domain thus far has been a lack of imagination. In the commercial world, because of the way the industry has developed, there long have been a handful of sharply divided paradigms for editing. Market strategy being what it is, it's in the interest of commercial developers to keep their products for the various paradigms

in separate tracks: more programs equals more redundant software sales, and the ability to set high prices for some markets while giving away the software for other markets (usually bundled with hardware). So far, open-source developers have been content to emulate it, and it's a philosophy that has hobbled the development of a killer app for video editing on Linux. All three of the projects covered here would do well to take a look at the asset management, footage commenting and multicamera switching strategies innovated by Drew Pertulla and implemented in his now-fallow multitrack editor Cuisine and at other innovations among the also-rans.

Fortunately, OpenMovieEditor and Blender are starting to break the mold, and I have high hopes that KDENLIVE will follow suit.

However, what's left is quite usable and in some cases bordering on downright impressive. So, grab your cameras, get a script, and dive on in! ■

Dan Sawyer is the founder of ArtisticWhispers Productions (www.artisticwhispers.com), a small audio/video studio in the San Francisco Bay Area. He has been an enthusiastic advocate for free and open-source software since the late 1990s, when he founded the Blenderwars filmmaking community (www.blenderwars.com). He currently is the host of "The Polyschizmatic Reprobates Hour", a cultural commentary podcast, and "Sculpting God", a science-fiction anthology podcast. Author contact information is available at www.jdsawyer.net.

Resources

KDENLIVE: www.kdenlive.org

OpenMovieEditor:
openmovieeditor.sourceforge.net

Blender: www.blender.org

"Linux Video Production: the State of the Art": www.linuxjournal.com/article/8589

"KDENLIVE Is a Promising Work in Progress": www.linuxjournal.com/article/9777

"Open-Source Compositing in Blender": www.linuxjournal.com/article/9831

Maximize Desktop Speed

Are you a speed junkie who wants the fastest, most responsive machine? Try these changes and get even more speed out of your Linux box. **FEDERICO KEREKI**

One of the best things about Linux is that you can get much more performance out of the same computer than with other operating systems. However, there always is room for improvement, and you should be able to get a bit more speed out of your box by applying some specific enhancements.

Don't expect miracles, however. No amount of tweaking can turn a Pentium II into a Quad Core monster (remember the old saying about silk purses and sow's ears?), but you can expect to get a more responsive machine that "handles" better. Although some of the changes are internal and hard to see, you will find that your system feels livelier, your clicks produce answers faster, you can switch between applications more quickly and programs run in less time.

Let's be practical. If you get a better CPU, there's probably nothing in this article that will match your results, and the same goes for a better graphics card or speedier disks. But, you expected that, didn't you? (Making such hardware upgrades would benefit not only Linux, but also every other operating system out there.) However, making such changes are practically the equivalent to getting a whole new machine, so you wouldn't be really enhancing the performance of your old box, but starting anew.

That said, this article discusses configuration changes with the aim to leave everything (well, almost everything) as it was but make it perform better. Of course, these changes aren't all equal; some are more difficult (and riskier), some require rebooting or other procedures, and some even require delving into the command line and editing configuration files. But, don't give up. The results are worth it.

As a final note, I use OpenSUSE (version 10.3) and KDE for the examples in this article. If you are using other distributions or desktop environments, you will find small differences in file locations or procedures. Currently, because most distributions offer exactly the same packages and drivers, one of the largest remaining differences between them is precisely in the configuration tools, so you may need to do some searching on your own. In any case, it's a safe bet you will find a way to manage anything described here, only in a different way.

RAM, RAM, RAM

Similar to the old real-estate adage "Location, location, location", getting more RAM, RAM, RAM will provide a great improvement. All processes need memory, and whenever the kernel runs out of RAM, it starts swapping to disk, but as this is orders of magnitude slower, your performance takes a hit. If you are willing to spend something, don't hesitate. Go out and get some extra RAM sticks for your machine. As soon as you plug them in, you will notice better performance. Getting more RAM isn't very costly, and it doesn't require

any configuration or re-installation.

Even if you don't want to spend the money for more RAM, you can make Linux manage the available RAM in a more efficient way. Here are some simple changes to consider:

- Change from KDE or GNOME to a lighter desktop environment. GNOME is about the worst in terms of RAM requirements (although it's far below that of Windows Vista), and KDE is a close second. Try using a less-demanding environment, such as Xfce or Enlightenment, which is used in gOS, the operating system pre-installed in the Everex Green gPCs sold at Wal-Mart [see Doc Searls' interview with David Liu on page 58 for more on the gOS]. Other possibilities include IceWM, Blackbox, Fluxbox, Fwmm, JWM or (the now seemingly defunct) Window Maker. Note that these window managers are not exactly equivalent to having a full desktop environment, so you will have to adapt a bit. Plenty popular distributions, such as DSL (Damn Small Linux) or Puppy Linux use these lightweight window managers, and many are available as optional packages for Red Hat or SUSE.
- Get rid of fonts you never use. I was once a fonts junkie and loaded my box with several hundred fonts (I'm not exaggerating) just in case I might use them some day. Each font requires memory, and the fewer fonts you have, the more RAM you will free. And, some programs will run faster, because they will have shorter lists of fonts to load.
- Reduce the number of virtual desktops. Windows users work with only one desktop, but do you really need 16 virtual desktops in Linux? Experiment a bit with this. I wouldn't go down to one desktop, but most of the time, having two or three virtual desktops is more than enough.

Getting Too Swappy?

Linux (as most other, if not all, modern operating systems) uses a technique called Virtual Memory to give programs the impression that they have plenty of memory available, even more than the actual RAM size of the machine. This technique implies using disk memory (the /swap partition) to simulate actual RAM, swapping pieces back and forth. Of course, whenever this swapping process runs, you will experience longer response times and slower performance.

The kernel tries to prevent future swapping by doing some of it in advance, and you can alter the degree to which this is done by changing a parameter from 0 (minimum swapping, done only if needed) to 100 (try to free as much RAM as possible).

There are two ways to change this. The standard value is

set at 60. To lower it, as root, do something like:

```
sysctl -w vm.swappiness=25
```

or:

```
echo 25 > /proc/sys/vm/swappiness
```

Note that this change will last only until the next time you restart your box. If you want to make the change permanent, edit /etc/sysctl.conf, and add a line like the following:

```
vm.swappiness=25
```

Now, it will be loaded every time you boot. If you want to test the changes, make the edit to /etc/sysctl.conf and then reload it with /sbin/sysctl -p.

Is it better to have lower values (down to 5 or 10) or higher values (up to 100)? Personally, I use 5, and I like the way my machines (desktop and laptop) work. If you notch it up, the kernel will use more CPU time to free RAM in advance; if you turn it down, the CPU will be freer, but there will be more I/O.

For CPU-intensive programs, if you have fast disks, I'd go with lower values, as I did myself. This will produce improvements, such as when switching between applications, because it's more likely that they reside in physical RAM instead of on the swap partition. Even if you set swappiness to zero, if needed, the kernel will do its swapping, so once again, you would benefit from getting more RAM if possible.

However, Linux kernel developer Andrew Morton suggests using 100, and author Mladen Gogale observes he found no difference, so you may want to try different values and see what you prefer (see Resources for links to articles on this topic).

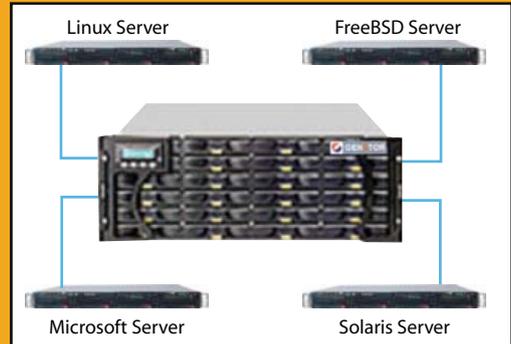
Make Applications Load Faster

Under Linux, most applications are in a special Executable and Linkable Format (ELF) that allows them to be smaller. Instead of including all needed libraries, the program file has references to them, which are resolved (or linked) when the code is loaded for execution. You might recognize here a classic time vs. space compromise: a smaller file size, but a higher loading time. If your program requires only a few libraries, the linking process is quick, but for larger programs that use several libraries, the linking process gets noticeably longer.

If you are game to using a bit more disk space (and spending some time preparing all files), you can use the prelink command to do the linking phase in advance and store the needed libraries within the program file itself, so it will be ready to execute as soon as it is loaded. (Actually, I fudged a bit here. When the program is loaded, the libraries are checked to verify they haven't changed since the prelinking, but that check is much speedier than doing the linking itself.) Using prelink in this way obviously requires more disk space (for there will be a copy of every prelinked library within each executable file), but with the current large disks, this won't even be noticed.



Linux - FreeBSD - x86 Solaris - MS etc.



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In order to prelink your programs, you need to set up a configuration file (`/etc/prelink.conf`), so prelink knows where to search for shared libraries and what programs to work with should you opt for the `-a` option and prelink everything possible. The format of this file is simple: blank lines don't matter, comments start with a `#` character, and the rest of the lines should be something like the following:

```
-l aDirectoryToBeProcessed
-h anotherDirectoryButAllowingForSymlinks
-b fileToSkip
```

The `-l` lines specify directories that should be processed. The `-h` lines are pretty much the same, but allow for symlinks, which will be followed, so the prelink process might end up working with files actually residing in other directories than the ones you originally specified. Finally, the `-b` lines show blacklisted programs (patterns also can be used) that should be skipped by the prelinking process. I recommend leaving these lines alone. If your prelink experiments show that certain programs cannot be prelinked (you'll get an error message if you try), you should add an appropriate `-b` line to avoid future unnecessary warnings. As an example, Listing 1 shows some portions of my (already provided in OpenSUSE) `/etc/prelink.conf` file.

If you want to prelink a single program, just do `prelink theProgramPathAndName`, and if the program can be relinked successfully (remember my comment—this just isn't feasible for some programs), the original binary ELF file will be overwritten with the new, larger, all-including version.

You could start a massive prelinking session by executing `prelink -a`, which will go through all the `-l` and `-h` directories in `/etc/prelink.conf` and prelink everything it finds. Here are a

No Prelink Needed in Ubuntu or Debian?

Recent Ubuntu and Debian distributions include a different mechanism for speeding application loading and a new linking mechanism that speeds up the linking process without using prelink.

To enable the faster startup times, do `sudo apt-get install preload`, and from that moment on, Linux monitors which applications you run and fetches those binaries and libraries into memory.

For example, if you use Firefox and OpenOffice.org every day, preload will determine that those two are common applications and will keep the needed libraries in RAM. Of course, should you change to Seamonkey and KOffice, preload eventually will detect your change of habits and do the appropriate thing.

few more options to note:

- Do a dry run by including the `-n` option. This generates a report of all results, but no changes will be committed to disk. Use this to see whether there are unexpected problems or files to be excluded.
- Include the `-m` option so prelink will try to conserve memory, if you have many libraries in your system (highly likely) and not a very large memory. On my own machine, if I omit this option, prelink fails to work, so my usual command to prelink everything possible is `prelink -m -a`.
- If you dislike the prelinked files, or if you get tired of prelinking everything every time you get updated libraries, use the `-u` parameter to undo the changes. Executing `prelink -u aPrelinkedProgramName` will

Listing 1. Portions of the Provided OpenSUSE `/etc/prelink.conf` File

```
# Acrobat Reader
-b /usr/X11R6/lib/Acrobat5/Reader/intellinux/bin/acroread
-b /usr/X11R6/lib/Acrobat7/Reader/intellinux/bin/acroread
# RealPlayer
-b /usr/lib/RealPlayer8/realplay

[...some snipped lines...]

# Files to skip
-b *.la
-b *.png
-b *.py
-b *.pl
-b *.pm
-b *.sh
-b *.xml
-b *.xslt
-b *.a
-b *.js

# kernel modules
-b /lib/modules

[...more snipped lines...]

-l /lib
-l /lib64
-l /usr/lib
-l /usr/lib64
-l /usr/X11R6/lib
-l /usr/X11R6/lib64
-l /usr/kerberos/lib
-l /usr/kerberos/lib64
-l /opt/kde3/lib
-l /opt/kde3/lib64
```

restore the program to its previous, unlinked format, with no fuss. Of course, for a radical throwback to the original situation, do `prelink -a -u`.

The prelinked versions of all programs are executed just like the normal ones, but will load a bit faster, thus providing a snappier feel. I have found conflicting opinions as to actual, measured results, but most references point to real speedups.

Speed Up the Filesystem

Every time you create, modify or simply access a file, Linux dutifully records the current timestamp in its directory structures. In particular, the latter update obviously implies a penalty on file access time. Even if you merely read a file (without changing anything), Linux updates the file's inode (see Resources for more on inodes) with the current timestamp. Because writes obviously require some time, doing away with these updates results in performance gains.

In order to achieve this enhancement, you need to change the way the filesystem is mounted. Working as root, do `cat /etc/fstab` to get the following:

```
/dev/hda1 /boot ext2 acl,user_xattr 1 2
/dev/hda2 swap swap defaults 0 0
/dev/hda3 / reiserfs acl,user_xattr 1 1
/dev/hdd1 /media/disk2 reiserfs defaults 1 2
/dev/hdc /media/cdrom udf,iso9660 ro,user,noauto 0 0
proc /proc proc defaults 0 0
sysfs /sys sysfs noauto 0 0
debugfs /sys/kernel/debug debugfs noauto 0 0
usbfs /proc/bus/usb usbfs noauto 0 0
devpts /dev/pts devpts mode=0620,gid=5 0 0
```

Given this output, the best candidates for the optimization are `/` and `/dev/hdd1`; `/boot` is used only when booting, `/swap` is out of bounds for you, and the others are not hard disks.

Making the change is simple. With your favorite text editor, add `,noatime` to the options in the fourth column. When you are done, issue the `mount -a` command to remount all partitions, and then issue a plain `mount` to check whether the changes were done (Listing 2).

Notice the `noatime` parameters in the `/dev/hda3` and

Listing 2. Checking the New Parameters with `mount`

```
$ mount -a
$ mount
/dev/hda3 on / type reiserfs (rw,noatime,acl,user_xattr)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
debugfs on /sys/kernel/debug type debugfs (rw)
udev on /dev type tmpfs (rw)
devpts on /dev/pts type devpts (rw,mode=0620,gid=5)
/dev/hda1 on /boot type ext2 (rw,acl,user_xattr)
/dev/hdd1 on /media/disk2 type reiserfs (rw,noatime)
```

Data Integrity vs. Speed?

Googling for filesystem performance enhancements, you might come upon a suggestion for `ext3` and `ReiserFS`, involving another mounting option: `data=writeback`. This option effectively undoes the advantage of those two filesystems by partially disabling their journaling. (Journaling is what ensures that your data won't be lost, even after a system crash.) If you include `data=writeback`, you'll gain an increase in speed at the cost of having old data show up after a crash. I don't like this kind of risk, so I don't use that option.

`/dev/hdd1` lines. Those mean you did everything right, and access times are no longer being recorded.

By the way, if you research this on the Web, you may find a reference to another option, `nodiratime`, which has to do with directories. Do not bother setting this option, because `noatime` implies `nodiratime`.

I ran some tests (creating lots of files, and copying them to

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/dev/null) and timed the results both with and without the noatime option and found some small performance enhancements—every little bit helps.

Now, if you gotten this far, you're ready for the big one: enhancing your kernel.

Get an Optimal Kernel

All the tweaks we have done so far are just part of the job, and you even can get a bit more speed if you recompile your kernel and adjust it optimally for your specific hardware and needs. Note that even though compiling a full kernel isn't the challenge it used to be (mainly you just have to make a few choices and key in some commands), there still is room for botching things up. Don't try this unless you feel comfortable.

Most distributions usually provide a one-size-fits-all kernel compiled with the most generic options, which should work for everybody. Of course, this won't necessarily fit your specific case. If your box has an Athlon XP CPU (as my laptop does), or many processors, or a certain graphics card, the generic kernel won't take advantage of them. What to do? You can tweak some kernel options and recompile it for optimal performance. Here, I pay specific attention to the options that enhance speed and responsiveness.

Compiling your kernel isn't that difficult, but remember there's a distinct probability of hosing your machine and turning it into a paperweight. (Okay, that may be a bit of an exaggeration. In the worst case, you simply would have to re-install Linux, and you wouldn't lose your data.) In my case, I used the YaST administration tool and installed two kernels, so I could choose either of them at boot time, and if I destroyed one, I could reboot with the other one, re-install the broken kernel and keep trying.

You need some specific packages to do this: kernel-source (the source files for the actual kernel), gcc (the compiler), ncurses (for the menus) and bzip2 (used internally to create boot images). You also need to know a bit about your hardware. Use `cat /proc/cpuinfo` to see how many CPUs you have and their brands, and `cat /proc/meminfo` for RAM information (Listing 3).

Start with a dry run and recompile the kernel without any changes, just to see if everything is set up okay. Working as root, do what's shown in Listing 4.

The make processes will run for a while, and although they might produce some warnings, there shouldn't be any errors. If everything still is running okay after you reboot, it means you can start experimenting; you already did a kernel build. (If things did go seriously wrong, reboot with the other kernel, re-install the thrashed kernel, fix the problem, and try a dry run again.)

Note:

The specific commands used in this article are appropriate for the OpenSUSE distribution, but do vary from one distribution to another. Check your documentation for the specific commands you will need *before* trying to recompile your kernel.

Listing 3. You will need information about your CPU and RAM before recompiling your kernel.

```
$ cat /proc/cpuinfo
processor       : 0
vendor_id     : AuthenticAMD
cpu family    : 6
model        : 8
model name    : Mobile AMD Athlon(tm) XP 2200+
[...some lines snipped...]

$ cat /proc/meminfo
MemTotal:      483488 kB
MemFree:       11560 kB
Buffers:       19888 kB
Cached:        323408 kB
SwapCached:    2768 kB
Active:        166432 kB
Inactive:      230396 kB
[...more lines snipped...]
```

Listing 4. Do a dry run to ensure that you have everything you need for compiling the kernel.

```
cd /usr/src/linux
make clean
make
make modules_install
make install
```

Tweaking the kernel is simply a matter of choosing the appropriate options from a (large) menu. As root, do the following:

```
cd /usr/src/linux
make clean
make menuconfig
```

and you will see a screen (Figure 1) with a menu full of hundreds of options, although luckily, you will have to change only a few of them.

If graphical interfaces are more your style, change the last command to `make xconfig` for a friendlier way of working (Figure 2).

The following are some of the options to change:

- Under General Setup, uncheck Cpuset support.
- Under Processor Type and Features, check Tickless System and High Resolution Timer Support. Select the right CPU type under Processor Family, so the compiled kernel code will be optimized for it, and uncheck Generic x86 Support, which is needed only for generic kernels. Choose the amount of RAM you have

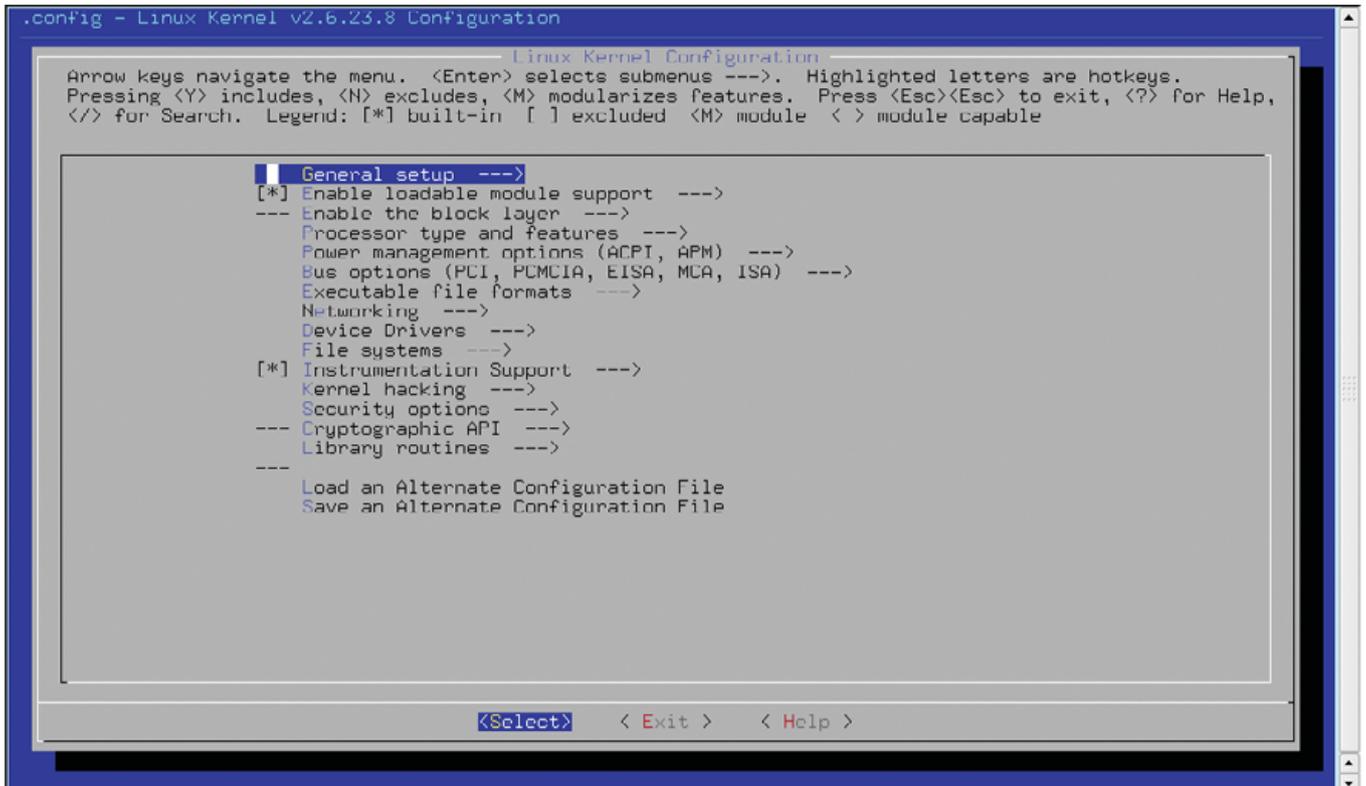


Figure 1. `make menuconfig` provides a console-like way to select kernel options.

under High Memory Support. Check Preempt the Big Kernel Lock, and under Preemption Model, choose Preemptible Kernel (Low-Latency Desktop). Note that for a server machine, you should select the No forced preemption option. Under Timer Frequency, choose 1000 (standing for 1000Hz). Finally, if you have a machine with only one CPU, uncheck Symmetric multi-processing support. If you have two or more CPUs, check that box, and under Maximum number of CPUs, enter the correct number. (All this data comes from doing `cat /proc/cpuinfo`, as discussed previously.)

- Under Block Layer, uncheck everything, unless you have disks larger than 2Tb.
- Under Kernel Hacking, uncheck Kernel Debugging, Collect kernel timer statistics, Debug preemptible kernel and Write protect kernel read-only data structures.

After you are done selecting options, exit the configuration

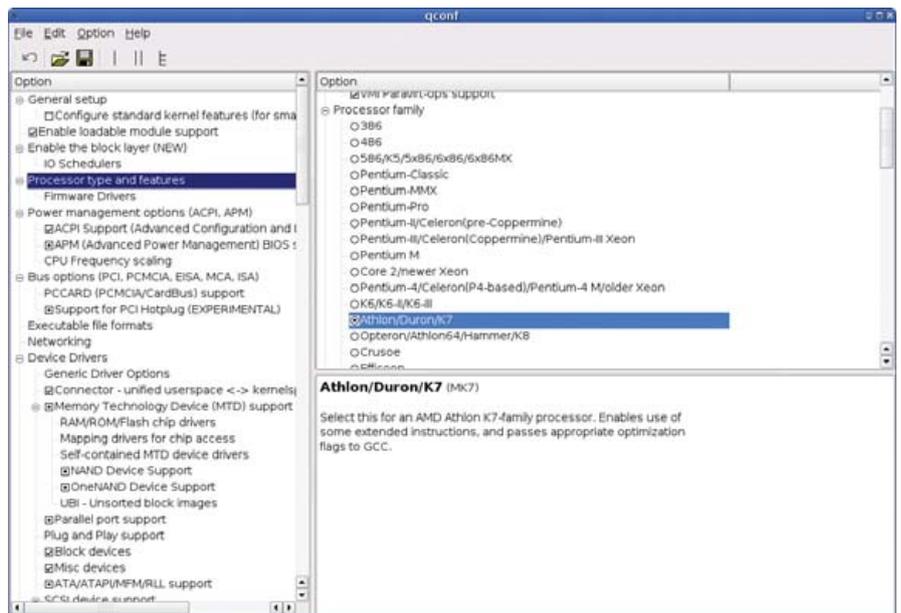


Figure 2. `make xconfig` produces a friendlier, graphical way to choose kernel options.

program (say “yes” to save the new kernel configuration) and then do the following:

`make`



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```
make modules_install
make install
```

Watch for unexpected error messages; there should be none. You will need to wait, as when you did with the dry run. On my laptop, the complete process requires more than 30 minutes. If you get an error message, either go back to the menu to try to fix whatever was wrong, or reboot with your backup kernel, re-install the broken kernel, and try again. If everything is okay, simply reboot, and try out your new kernel.

Conclusion

By applying just a few changes to your Linux box, you can get a faster response and greater speed, and you will be able to show off your machine to everybody. Then, after following the suggestions in this article, look around the Internet on your own, and you will be able to pick up more speed, but be careful, making these enhancements can become addictive!■

Federico Kereki is an Uruguayan Systems Engineer, with more than 20 years' experience teaching at universities, doing development and consulting work, and writing articles and course material. He has been using Linux for many years, having installed it at several different companies. He is particularly interested in the better security and performance of Linux boxes.

Resources

"The ELF Object File Format by Dissection" by Eric Youngdale:
www.linuxjournal.com/article/1060

"Making inodes behave" by Clay J. Claiborne, Jr.:
www.linuxjournal.com/article/4404

"Wikipedia: Inode": en.wikipedia.org/wiki/Inode

"Linux: Tuning swappiness": kerneltrap.org/node/3000

Wikipedia: Virtual Memory:
en.wikipedia.org/wiki/Virtual_memory

"Tuning Linux VM on Kernel 2.6" by Mladen Gogala:
www.dba-oracle.com/t_tuning_linux_kernel_2_6_oracle.htm

"...and especially for your laptop": beranger.org/index.php?article=1547&page=3k

gOS Features: www.thinkgos.com/technology.html

gOS, Wikipedia: [en.wikipedia.org/wiki/GOS_\(Linux_distribution\)](http://en.wikipedia.org/wiki/GOS_(Linux_distribution))

Xfce: www.xfce.org



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At the Internet Identity Workshop (IIW) a couple months ago, I sat at a table where a couple guys discussed whether certain code belonged in kernel space or user space. I missed the details, but it seemed meaningful to me that the IIW is a workshop for developers of user-centric identity management systems. All the IDM (identity management) communities represented at IIW—OpenID, Higgins, CardSpace, OSIS, Oauth, ClaimID, Bandit, Liberty and so on—grew out of the need for users to be in control of their identity-based relationships, rather than to be controlled within the walls of “relationships” defined by the kind of “identity providers” whose cards fill our wallets.

Later it occurred to me that there’s a similar distinction between our own kernel and user spaces—that is, between the core capabilities we bring to the world and the way those capabilities are put to use, especially in the marketplace.

Think for a minute about how clothing works in a society. In a way, it drives how we work in the world. Whether practical or merely symbolic, our clothing qualifies us to fly a commercial airplane, argue a case before a judge, rivet girders in a high-rise, look presentable in a business meeting or geek-out amongst fellow engineers.

Now, think about how wallets work. They not only carry currency, but various forms of identification as well. These, however, differ from clothing in one important way: nearly all forms of identification are provided for us by outside organizations. This goes for our driver’s licenses, our credit and debit cards, our membership cards and insurance cards. In terms of clothing, these cards are little rectangular uniforms. So, even if they have our names on them, they are not ours. They are issued, and belong to, entities outside ourselves—entities that enable but also control and restrict how we deal with a range of uses.

Except for sole-proprietor business cards, none of the rectangles in our wallets are ours. Yet, they contain the means by which we perform in the marketplace. Here’s another way of looking at it: the cards in our wallets are like proprietary drivers in our kernels.

What would happen if we had our own relationship drivers inside our own kernels? These drivers would not be written and provided by outsiders as ways of driving us as customers and citizens, but rather written for us (and by us) as ways we can drive relationships with governments, retailers, health-care providers, service organizations and other entities that could actually benefit by not having to control everything.

For example, we could have “preference drivers” that express market logic, such as, “If I’m calling for tech support, *then* you can’t give me a promotional message.” We might even add an incentive, such as, “*And* I’ll pay you \$.50 for getting me to a human being in less than a minute.”

We could have “request drivers” that support the expression of demand for goods and services, such as, “We need a stroller for twins, sometime in the next five hours, from any retailer within five miles of Highway 70 between Salina and Kansas City.”

We could have “trust drivers” that support the expression of our own usage and license agreements. These could say, “Here’s all you need to know to trust me, with automated links to one or more verifying trust-assurance organizations, so we can both be spared any wasted effort.” These could selectively disclose relevant memberships, credit worthiness, past dealings and so on—all on a need-to-know basis, without requiring us to fill out forms or even reveal our names.

These kinds of blue-sky scenarios are prevented only by business defaults set to regard the customer as a dependant and subordinate entity rather than an independent and equal one. Preserving this kind of caste system traditionally has been seen as a business requirement, but it’s not. Free customers can be a lot more valuable than enslaved ones.

So, why aren’t we free? Why are we dependant variables instead of independent ones? Because markets are programmed and driven by vendors and other large organizations that treat us as devices to be driven, rather than the drivers in our own right. Or, in tech terms, they pack us full of proprietary drivers that

enforce dependency and wear blinders to the benefits of customer independence.

Customers need to drive and not just be driven. We don’t yet know what forms the driving code will take, but there’s a hole where it should go, and it’s in ourselves—or in the layer of code and protocols by which we address the connected world. This is a huge frontier, and so is the huge new market that will open for commercial facilitators of customer independence.

The need for a self-hack was highlighted nicely by Facebook when it launched its “Beacon” advertising system last November. As I write this, Facebook has attracted more than 55 million users (not customers, or the company might be more accountable to them) into its walled garden. Everything went fine until Facebook found ways to track, expose and monetize users’ relationships, by following and in some cases exposing the crumb trails they leave on the Web. A great cry went up, much news was made, and Facebook made adjustments that I’m sure it’s still tweaking as you read this.

But, nothing it does will change the basic problem, which is a lack of native power on the users’ side. So, in that absence, all the rules for relating to, and within, Facebook are controlled by the company. This is the way things have been for every B2C company, since the dawn of the Required Agreement.

Does it have to be this way? No. We don’t need Required Agreements any more than we need proprietary operating systems and software. Relationships should be mutually respectful and agreeable. Much more will get done that way, more cheaply, with much better code and much less wasted effort.

So, to sum up, we won’t have market relationships worthy of the label until market space becomes user space. Until then, the markets we call “free” will still too often consist of “your choice of walled garden”.

We’ve broken out of that conceptual trap before. We can do it again. ■

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