Fedora and RHEL
– a winning team

With preparations underway for the next Red Hat release and a successful Fedora 13, Red Hat is doing quite a number on **Shashank Sharma**'s radar.

Corporate backing and a large supportive community – almost all Linux distributions can boast of at least one half of that. Fedora, since its inception in late 2003 as Red Hat's community distribution, has nurtured around itself a devoted community. It has achieved this after providing, release after release, an innovative and complete distribution that demands attention and respect.

Being a rather large distribution (the number of DVD distributions now pales in comparison to single CD variants), Fedora 13 has something for just about every variety of Linux user. With Fedora 13 fresh out of the oven and RHEL 6 almost ready to be served, let's examine the relationship up between these two superheroes of free software, see what Fedora 13 has to offer and find out why this is the right time for RHEL 6.

Revelations
According to Paul W Frields, Fedora Project Leader, Fedora's feature process and diverse community of developers and contributors enables it to include a wide range of features in each release. "Fedora 13 sports an array of desktop features that will help any computer user make better use of their hardware – from 3D support for their graphics card, to colour management for their input and output devices, to automatic installation of printer drivers. But this release also brings advanced functionality for developers, such as better monitoring tools that allow a Python developer to measure activity on his system to find bottlenecks in Python code he's developing. And system administrators will be excited about the redesigned

authentication tool in Fedora 13 using the System Security Services Daemon (SSSD) to allow managed domain logins, even for laptop users who are away from the network".

Virtualisation leader
Fedora has provided a stable home for virtualisation technologies for some time now, and Fedora 13 continues the trend. In fact, on offer are leading-edge virtualisation improvements, according to Frields. "As always, Fedora continues to lead the pack in virtualisation features, since our community developers are actually heavily involved in upstream areas like the kernel and the *KVM* hypervisor". Although Fedora persisted with *Xen* for a few years, the

❯ **Carefully select the OS type and the Version when creating a new virtual machine.**

amount of time and energy needed to get it to work with the Linux kernel was a drawback. Support for KVM stable PCI addressing and Virt Shared Network Interface are two major *KVM* offerings in Fedora 13. The shared network interface technology enables virtual machines to use the same physical network interface cards (NICs) as the host OS.

All virtual machines under your Fedora 13 installation are managed by the Virtual Machine Manager tool under Applications > System Tools. You can create or restore existing virtual machines in a matter of minutes, as the interface is very easy to use. Many recent distribution releases require at least 1 GB RAM, so if you don't allocate that much when creating your virtual machine, you will probably not be able to run a graphical installation in the newly created virtual machine.

Polished installation

Fedora has never been an overtly difficult distribution to install. Still, Fedora 13 comes with a smarter version of the *Anaconda* installer that makes installation even simpler, thanks to improvements in how it handles storage media and partitioning. Also available now is the option to install Fedora over the internet.

The boot images are available for a variety of media including USB and CD from **boot.fedoraproject.org**. These boot images allow the system to connect to a remote server to launch the installer, doing away the need for 700MB disks or 4GB DVDs as the installation media of choice.

Hardware support

A long standing argument against Linux adoption has been that Linux doesn't have the same level of hardware support as proprietary operating systems. To that end, Fedora 13 offers the Nouveau drivers with experimental 3D support for Nvidia cards, so users don't have to rely on untrustworthy proprietary drivers that can't be debugged or improved upon. The real prize, however, is the Automatic Printer Driver Installation feature.

All printers, whether they connect via USB, parallel ports or over the network, identify themselves using a Device ID string containing information such as manufacturer, model name, supported command sets and suchlike. Historically, configuring a printer has been bothersome for most users – more often than not because they don't know the correct driver for their printer.

Imagine, however, if printer drivers contained tags associating them with certain manufacturers and model numbers, such that when Fedora detects your attached printer, it immediately looks up the drivers that carry matching manufacturer and model tags and automatically installs the driver. This is now possible in Fedora 13, hence the very suggestive feature name.

Programmer's playmate

By providing parallel-installable Python 3, which means that Python 3.1.2 can now be installed in parallel with Python 2.6.4, Fedora 13 is marketing itself as the ideal platform of choice for developers.

Python 3 solves many of the long-standing issues in Python 2, but in doing so it has mutated into an almost entirely new language. The *2to3* tool provided by Python can
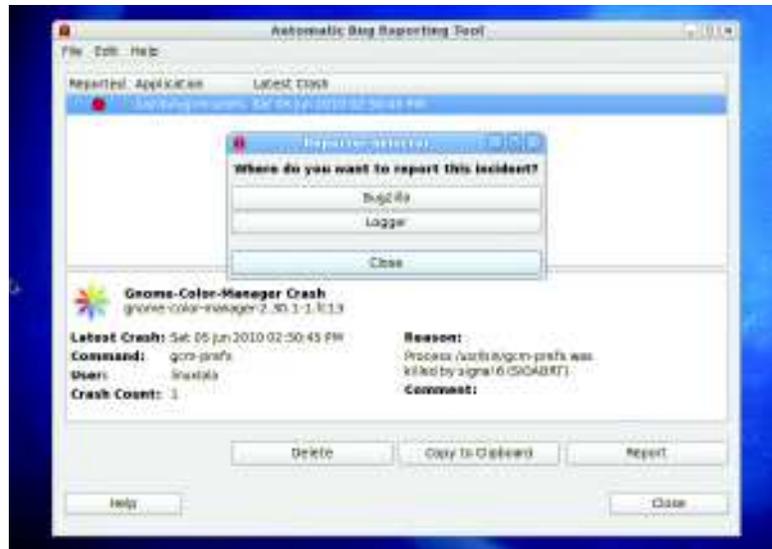
be used to automatically convert much of Python 2 code to Python 3, but there's a catch. When we say Python, there are three intertwined components at play: the core runtime, the standard library, and a host of other third-party modules on top. The trouble is that not all modules (which number in the hundreds) have been completely ported to Python 3. Fedora 13 thus provides both Python 2 and Python 3 stacks to provide developers the means to continue their work and also prepare to make the transition to Python 3.

The second Python-related feature enables developers to measure activity on their system to find bottlenecks in Python code they're developing. *SystemTap* is a tracing/probing/monitoring tool which enables users and developers to observe their system beyond the kernel. In effect, you can see what's happening inside your application and language runtimes like Python, etc.

Since Python code is easy to mix with code written in other languages (for example, C), the third Python-related feature, an extended *GDB* (GNU debugger), reports mixed C and Python-level information on what such processes are doing. You don't need to be an expert *GDB* user to debug code wrapped in Python, as the improved *GDB* makes it convenient for even Python newbies to take advantage of this feature.

Btrfs filesystem snapshot

Have you ever feared doing something adventurous on your system only to end up with an unusable machine? Btrfs can create lightweight bootable filesystem snapshots. System rollback using btrfs enables administrators and users to revert to a previous snapshot should the system become unusable. Since btrfs creates entire filesystem snapshots that can be created automatically or manually at the user's demand, the entire filesystem will revert to its previous state when you revert to a snapshot For example, if you make a snapshot each time you delete or install new packages, reverting to an older snapshot wouldn't just affect the state of those packages – it would also affect your home directory if it too is on the btrfs partition. ext4 is the default filesystem on Fedora 13 but you can easily choose btrfs during the installation process.

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> **The Automatic Bug Reporting Tool enables even non-power users to file bug reports. You can access it from the Applications > System Tools menu.**

> ## "Fedora 13 comes with a smarter version of the Anaconda installer."
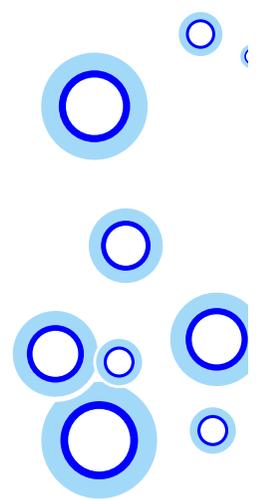
A history of innovation

An important aspect of the Fedora release cycle is the continuing development of key features across releases. We've seen this with the faster startup times: Fedora 10 had a 30-second startup and it was down to 20 seconds in Fedora 11. This is one of those features that will continued to be worked upon into and beyond Fedora 14.

Similarly, *Archer*, a *GDB* development branch with better C++ support and Python scripting capabilities, made its debut with Fedora 11 and now in Fedora 13 we have a smarter *GDB* that every Python programmer should celebrate.

"Over many releases we build on a solid base of engineering expertise and work to extend the functionality of a completely free and open source software platform", Paul Frields explains. "Take free video drivers for instance. In Fedora 10 we introduced kernel modesetting to speed up the boot process on a few ATI video cards. In Fedora 11 we extended this function to lots of video cards, and began a process of extending support for 3D acceleration in totally free video drivers with Intel graphics cards. In Fedora 12 we built on that platform with experimental 3D support for ATI cards using the 'radeon' driver, and Fedora 13 included not only stabilising the ATI support, but extending 3D to Nvidia cards using the 'nouveau' driver".

> ## "RHEL 5 introduced Xen as the virtualisation platform of choice."

Network Manager
An example of a far longer-term project is the *Network Manager*, which was introduced way back in 2007 as part of Fedora 7. By the time Fedora 12 came, it had become the *de facto* network configuration solution for just about all distributions. With Fedora 12, *Network Manager* introduced mobile broadband support and finally in Fedora 13 we get support for dial-up modems for older Bluetooth-equipped phones. It also provides a command line interface, enabling users who run a text-only system to still take advantage of this brilliant tool.

❯ **You don't get the option to use the btrfs filesystem unless you boot the installation disk with the btfs option.**

Another new feature courtesy of Fedora 13 is the colour management. This enables users to create unique colour profiles for different hardware devices such as printers, scanners and monitors, enabling artists, photographers, designers, produce better work using free software.

According to Frields, the advances in free video were created in large part by engineers employed by Red Hat to extend the possibility of free software on the desktop. "The free video driver story is just one example of how the Fedora Project and Red Hat have worked together not just to integrate but to improve the state of free and open source software."

Virtualisation tools
KVM now also finds its way into the upcoming RHEL 6 and, as Frields explains, this is how the two distributions often team up. "Fedora is a free distribution, community project and upstream for Red Hat Enterprise Linux… [it] serves as the community R&D lab. Fedora is a general-purpose system that gives Red Hat and the rest of its contributor community the chance to innovate rapidly with new technologies".

People will clearly see a reflection of the very recent and past Fedora releases in RHEL 6. In a sense, looking at Fedora releases, you can make a fairly accurate prediction of some of the technologies and features that the next Red Hat Enterprise Linux release will offer.

Tim Burke, vice president of Linux engineering at Red Hat, further clarifies that individuals and businesses are often willing to participate in Fedora to see some features make their way into RHEL. "We are increasingly seeing customers who have specific use case needs who are willing to contribute with us in Fedora in the interest of having the feature productised in Red Hat Enterprise Linux".

And since everybody from home makers to hardware manufacturers are interested in energy efficient systems, Burke continues with this example: "Many people, ranging from end users, to hardware vendors, to government customers have an interest in energy efficiency. Users from these diverse points of view worked with us in Fedora 12 and Fedora 13 to audit and improve many of the default system services to be much more power efficient. This type of work will be directly applicable on a supported basis in Red Hat Enterprise Linux 6".

Meanwhile over in RHEL…
Red Hat has been around forever and seems to have fingers in many pies, and yet it has avoided making unpopular deals with proprietary software giants, seeking suitors for a takeover or dishing out cheap shots at its competitors. How does Red Hat keeps its focus?

According to Burke: "Due to the fact that Red Hat is the leading contributor to most of the leading technologies comprising the operating system (ranging from kernel, filesystems, storage management, compilers, security features to Gnome desktop and desktop applications), we are both a producer and consumer of open source. Many other Linux companies are more consumers than contributors to Linux, which shifts their positioning".

Continuing the drive to lower the total cost of data-centre deployment is the biggest push for RHEL 6, as per Burke. Another key focus area is virtualisation. The recent launch of hardware from both Intel and AMD has significantly changed the definition of commodity hardware. For instance, 64-bit rackmount servers are now available, and although virtualisation workload consolidation is an outstanding use of this scale of hardware, according to Burke, there are very few workloads today that can fully capitalise on 64-bit CPUs.

Enabling bare-metal efficiency by way of performance optimisations, but still providing administrators the benefits of virtualisation such as flexibility and efficiency is a key area of Red Hat Enterprise Linux 6. IO enhancements is another virtualisation-related development in RHEL 6. According to Burke, virtualisation was not an acceptable platform for IO-intensive workloads such as messaging and databases, because of an associated overhead of up to 40%. However, this IO overhead is reduced to under 5% in RHEL 6 thanks to cooperation between Red Hat's team of engineers and their hardware counterparts.

"This new class of hardware and Red Hat Enterprise Linux optimisations allow virtualisation to be an effective deployment vehicle for all categories of workloads. This opens up doors of flexibility, platform independence and growth opportunity from clouds", Burke offers.

Xen is cool

Red Hat Enterprise Linux 5, released in 2007, introduced *Xen* as the virtualisation platform of choice. However, Fedora has since shifted to *KVM* and so *Xen*, although supported for a few more years for RHEL 5 customers, will not be offered in RHEL 6. Instead, users will be provided the means to convert their existing *Xen* virtualisation images to *KVM*, should they so choose.

RHEL has claimed the title of *de facto* standard Linux enterprise server, and we asked Burke to point to some of Red Hat Enterprise Linux's key milestones in recent years. Typically purchased as an expensive third-party offering, the virtualisation offered in Red Hat Enterprise Linux 5 brought increased operational efficiency to data-centre admins at commodity pricepoints.

Equally importantly, SELinux-enabled security, by isolating system exploits, has given RHEL an exemplary record of being resistant to hostile attacks.

And finally we have real-time low-latency. Rubbing shoulders with the upstream community, Red Hat engineers developed a set of capabilities that makes systems respond
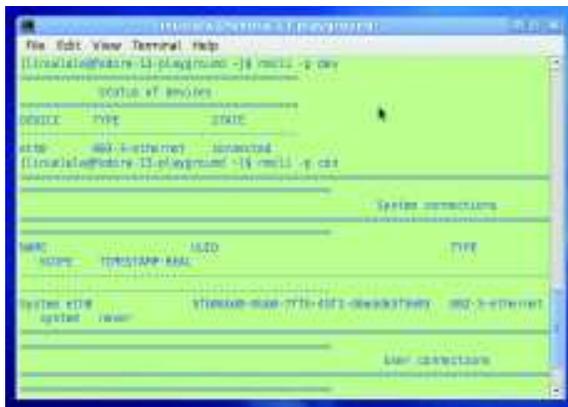
› *nmcli*, **the CLI tool for controlling** *Network Manager,* **is still not quite comparable with its graphical sibling.**
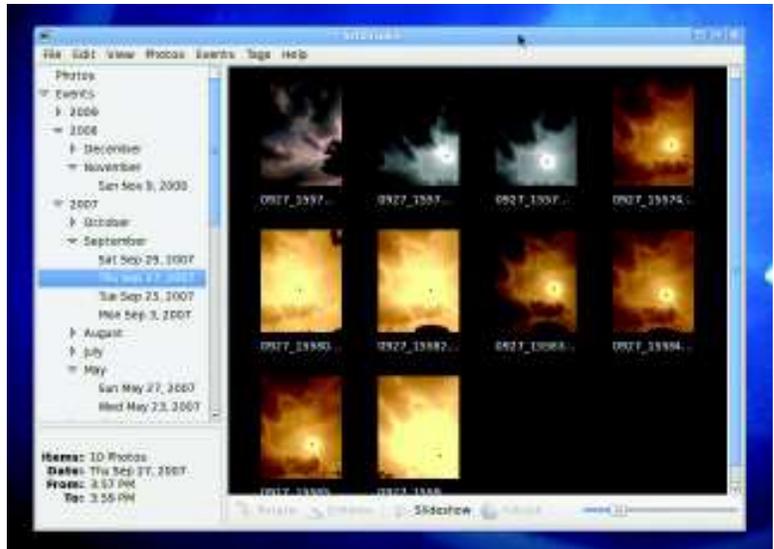
in highly predictable and controllable time constraints. These provide more precise timekeeping and ensure priority applications get the most runtime. All types of workloads, from databases to graphics display to high-speed messaging benefit from these features.

Fedora spins

Alternate versions of Fedora offering a select set of applications and customisations tailor-made to cater to a niche group of users are termed 'spins'. Games, KDE and *Xfce* spins have been around for a long time now but Sugar-on-a-Stick (SoaS) is a new addition.

Designed originally as part of the One Laptop Per Child Project for schoolchildren, the Sugar Learning environment can now be thought of as independent of OLPC hardware, since it can run from any USB thumbdrive, and all it takes is a measly 500MB ISO file. Children can thus access their computing environment using any machine available at home or at school without being bound to a laptop.

Also rather popular is the Security Spin, which is maintained by a community of security testers and developers and features a secure test environment to work on security auditing, forensics and system rescue.

You can create your own Live USB spins using the Live USB creator tool, which is available with a quick:

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su -c "yum install liveusb-creator"
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The numbers game

It's only natural to want to compare Fedora with Ubuntu, but we have to point out that both these distributions have very distinct origins and goals and cater to different kinds of end users. Still, in most popularity contests, Fedora can at best play second fiddle to Ubuntu. This despite Fedora's innovations and persistent track record of producing a distribution that offers something for everyone.

If you use one and are completely satisfied with it, doesn't mean you're required to throw dirt at the other distributions. And yet, more often than not, the only argument against Fedora is that it's not like Ubuntu.

"Historically, Fedora's focus has always been on empirical measurement and encouraging sustainable community. The Fedora Project continues, for example, to publish complete and verifiable statistics pertaining to downloads and user hardware profiles", Frields argues. The stats page tracks these numbers at **http://fedoraproject.org/wiki/Statistics**. **LXF**

› *Shotwell* **is the replacement tool for** *F-Spot Photo Manager* **in Fedora 13. Another Mono app replaced is** *Tomboy.*