

Bench philosophy (20): Using free software in the lab

Time to Break Free

When you bought PCs for your lab, they almost certainly arrived already set up with an operating system. But an operating system isn't enough to get everything done. You need to buy applications and then things can start getting expensive. What about using free software?

Free software has a reputation for being poor quality, virus-laden and unsupported. Scientists share a commitment to doing things to a high professional standard and that implies being prepared to pay for the right tools. But "free" doesn't necessarily mean "cheap and nasty" and whilst it may well be true that many free downloads are hardly worth the effort of clicking on the install button, there is silver among the dross.

Let's start at the very root of the question. Can I run my lab on a free operating system like **Linux**? Linux originated as the personal project of Linus Torvalds but his Unix-like system soon took on a life of its own, and now has a growing and highly loyal following.

Linux, along with other free operating systems like FreeBSD, is steadily gaining a respectable share of the market. Users claim that Linux has grown beyond its geeky origins and broken into the domestic desktop world. Indeed, you can now buy laptops with Linux pre-installed. There are even rumours that Google are working on their own free operating system, widely suspected to be Linux-based. Linux has a reputation of being hard to install and hard to use, the exclusive reserve of engineering graduates or computer geeks. Certainly, in the past, installation was a nerve-racking ordeal. But that has all changed over recent years and the latest distributions, such as Ubuntu, make installing Linux as easy as installing Windows.

The kernel of the matter

If you should decide to give Linux a try, you must first choose which distribution to go for. Strictly speaking, Linux refers just to the kernel, the core operating system that keeps different parts of your computer talking to each other. This kernel is usually bundled together into a distribution ("distro" to the expert): a set of essential programmes that make your computer useful to you. The most popular distributions for the desktop include Fedora Core, Debian, Suse and Ubuntu. For people coming from

a Windows background, Ubuntu will probably be the most familiar and is currently one of the most popular choices.

Indeed, "choice" is one of the key words in the Linux world. Linux boasts the ability to mix and match widely different desktops (not just different themes), window managers and file managers. This can be a bit bewildering for the new user, who usually expects just to click "OK" a few times and accept all the defaults. But, if tweaking doesn't appeal to you, don't worry – the default values in distros like Ubuntu can usually be trusted.

Where Linux may sometimes let you down is in its hardware support. Drivers for the most up-to-date devices are often simply not available in Linux so, until someone volunteers to write one for you, you simply can't use that hardware. For most devices such as printers, cameras, scanner and wireless cards, this isn't an issue and, in any case, any distributions have an online checklist so that you can find out in advance if a particular piece of hardware is supported.

Once you have your Linux distribution installed, chances are you have just about everything you need to get up and running, at least for everyday tasks such as emailing, writing and working on presentations. Some specialist software may not have a Linux version but there are probably free alternative programmes that work just as well. Or you may decide to stick with Windows. In either case, what free options are there?

Open Office is a fully integrated productivity suite, incorporating "Writer" (a word processor equivalent to Microsoft Word), "Calc" (similar to Excel), a draw-

ing programme and a presentation application "Impress" (similar to Powerpoint). Open Office will do most things you'd expect from commercial productivity suite and what it can't do you probably don't use in those commercial versions anyway. Open Office's appearance will be very familiar to users of Microsoft Office, and it opens and saves .doc files (as well as the newer .docx format), usually without any major damage to the formatting. Though Scientists may be disappointed, with the standard bibliography manager built into Open Office, you

can get around that by using the online reference manager, **Zotero** (<http://www.zotero.org/>) – another example of high quality freeware. Open Office can be downloaded from <http://download.openoffice.org/>.

Why bother installing and maintaining a productivity suite on your computer, when you can use several on the net? Web-based document authoring means you can

access your documents anywhere, provided you have an internet connection. Collaboration is easy and, in many ways, is easier to manage than "tracking changes". Of course, free sites offer no guarantees and if they accidentally delete all your work they are under no obligation. But on the other hand, how much will the supplier of your favourite commercial word processor help you if you lose a document when your desktop programme crashes?

Of course, being web-based, you have problems if the net goes down and things can get slow over some internet connections. But even then, there are ways of getting around these problems, too. **Google Gears**, for instance, lets you work on docu-



ments you have on compatible sites (such as Google Docs and Zoho), even when access to those sites is temporarily unavailable.

If you feel happy with your files residing on Google's servers, **Google Docs** (<http://docs.google.com>) offers a word processor, presentation producer and spreadsheet programme. It opens and saves both proprietary formats, such as Office .doc and .xls, as well as Open Office and other open document formats. Google Docs makes collaboration easy: a document can be worked on by several workers at the same time (anywhere on the planet!) and the development of the document is preserved using a revision history mechanism.

Zoho (<http://www.zoho.com/>) goes even further than Google Docs in the range of services it offers. These include an online planner, a wiki, an email server and a note-taking tool. Zoho and Google Docs share some close affiliations – you can log into a Zoho account straight from your Google account.

Days of webmail have made free emailing about as straightforward as it gets. Webmail solutions are now looking more and more like full-blown desktop Personal Information Managers (PIMs), integrating email with calendars, contact lists, task lists and chat. With web-based PIMs it is easier to access your data anywhere, run searches (often exploiting advanced search engine technology) and share calendars. If keeping your PIM in the computing cloud is not the way to go for you, there are still some free desktop alternatives to Outlook to consider. **Evolution** (<http://projects.gnome.org/evolution/>) is the usual default PIM with many Linux distros and closely resembles Outlook in appearance and design, although many potential users will be put off by its ability to synchronise only with Palm mobile devices.

Free desktop publishing alternatives

Have you ever spent time carefully placing a picture into your Word document, then typed around it, only to find it has disappeared and you find it three pages down? Word has many excellent features and performs well overall but it can't do everything. After all, it is a word processor, not a desktop publishing system. To prepare a publication that relies on the careful layout of both graphics and text, you need a desktop publishing programme like QuarkXPress. If your budget won't go that far, a free alternative is the open source **Scribus** package (<http://www.scribus.net/>). Easy to use, Scribus boasts printer-ready output with profes-

sional colour management and can export to pdfs.

Adobe's famous Photoshop and Illustrator programmes are highly renowned. They are also highly pirated. Adobe is addressing this problem with web activation. After all, software piracy is theft, not good practice for a professional lab (or for anyone come to that). Now, there are plenty of free vector drawing and photo editing programmes but you have to be choosy.

GIMP (the GNU Image Manipulation Programme) is, in my view, the best free alternative to Photoshop and Illustrator, combining the utilities of both. If you are used to Adobe's products, there will be much familiar in GIMP as the overall design is very similar. GIMP supports a huge range of image formats and supports many hardware devices used in computer image work, such as tablets and MIDI controllers. GIMP is available at <http://www.gimp.org/>.

Data blotting and analysis

Unless you are using specialised data visualisation and analysis software, most of your daily data manipulation is probably done in a spreadsheet such as Excel and can be done just as well in Open Office. Although this is all you need for trivial tasks, what about something more complex, like measuring time constants of a response or running a multivariate analysis of variance? You could be expected to fork out quite a lot for a statistics package and yet more again for a data presentation package. What alternatives are available in the free world?

Gnuplot (<http://www.gnuplot.info/>) is a no-nonsense, command-line driven plotting programme with a very Unix flavour. Although very powerful, it may not appeal to someone who doesn't enjoy learning a new plotting language. This is where **Grace** comes in. The Grace plotting package (<http://plasma-gate.weizmann.ac.il/Grace/>) has a graphical, point-and-click interface, making it easy to get started with, but also has a scripting language for the more advanced user. Grace also incorporates some analysis routines such as curve fitting, interpolation and correlation.

When it comes to statistics, there's nothing you can't do with "R". The **R statistical package** (<http://cran.r-project.org/>) combines powerful statistics with almost limitless graphing capabilities. R is not only free but is the software of choice over commercial alternatives for many serious statistics researchers. Although it is command-line based, the language is very high level so it is not difficult to master the basics. As well as

doing statistics, its plotting is excellent and probably the most flexible available. A huge array of extra packages are available and organised according to topic on a centralised site at <http://cran.r-project.org/web/packages/>, and a Google search will also reward you with yet more packages on individuals' web sites. So, if you read about some fancy new powerful analysis method and want to try it out on your data, just download the package and go. But beware: the authors of the packages do expect you to know something about what you are doing. R doesn't ask questions.

For general numerical computing, **Scilab** (<http://www.scilab.org/>) is often described as the free version of Matlab. A programming language, data analysis suite and a plotting programme all in one, there is very little it cannot do. To pick one out of many possible examples, with Scilab it is fairly easy to generate an animated 3D plot of data – try doing that in Excel! User-contributed toolboxes (collections of functions) extend the power of Scilab even further.

You're not an owner, just a user

Why bother with free software in the first place? Isn't it something like a fad diet – something you really believe in and try to convert others to but are never likely to adopt yourself? After all, if a job is worth doing, it's worth doing well and surely the lab must be prepared to pay for the best tools for the job. But in some cases (such as R) the best tools also just happen to be the free ones, whereas in other cases, the cost of some suites prohibits installation on every lab member's desktop. And why *should* you have to pay a large software company to be able to read certain documents (in many countries, some government documents for informing the public are in Word)? Even when you have paid for a commercial programme, remember – you still don't own the copy you installed. You have paid for permission to use it and the permission almost certainly places restrictions on what you can use it for. Perhaps free software will never completely take over our hard drives but it is gaining ground and respectability. And it can save you a lot of cash.

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Fancy composing an installment of "Bench Philosophy"?

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