

Handout for PLC Open Source Software Training:

Technical Notes

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1. About Open Source Software (OSS)

Overview

Primarily a *methodology* for developing software, enabled by a copyright licence that encourages open (public) development and access. Usually includes:

- Public development – public code repositories, bug reports and fixes
- Public documentation and roadmaps
- Open governance and software maintenance models:
 - Eg – Linux (BDFL with generals), Apache (maintenance team), RHEL (company maintenance and aggregation)
- Ultimately driven by enlightened self-interest – contributing reduces workload. Competition happens at the services level

Often used on context of Linux-based operating systems (like Ubuntu, Red Hat, Suse), but there are several commercially viable OSS operating systems and *thousands* of commercially viable OSS applications.

OSS Research and Analysis

- Australian Service for Knowledge of Open Source Software (ASK-OSS) – includes research papers, TCO/ROI documentation, policies from Government and education around the world, case studies and more.
<http://ask-oss.mq.edu.au/>
In particular there is a page of recent research papers and documents here:
http://ask-oss.mq.edu.au/index.php?option=com_content&task=view&id=75&Itemid=37
- Open Source Industry & Community Census (Waugh Partners).
<http://census.waughpartners.com.au/>
- Community wiki with links to Australia OSS information and projects.
<http://openeducation.org.au/>
- Information about OSS in education from Linux Australia (the national community organisation). <http://www.linux.org.au/education>

Licences

- Free to use, modify and redistribute.
- Some licences require modifications be made publicly available if and only if you *distribute* a changed version of the software *externally* to your organisation.

Technical Benefits

There are several key technical potential benefits with OSS solutions.

- Flexibility – you can change, tweak, upgrade, analyse, and configure OSS, at an application or code level. Particularly useful for web applications.
- Updates and upgrades – updates (including security updates) are often automatic, particularly when installed on Linux which itself updates automatically if desired.
- Access to developers – if you want specific functionality or assistance, often enough OSS developers are available by email and quite responsive.
- Scalability – unlimited by CALs and can scale to very large workloads (see Google, Amazon, Yahoo, Government use of OSS and much more).
- Tinkering – you can easily find and download an OSS solution to pretty much anything you want to try. This means you can download and play with potential solutions without any software costs and without having to engage with any company commercially.
- Community – access to the OSS community is helpful for support, knowledge and training, as well as the opportunity to be consistently learning new stuff.

2. Finding OSS solutions

There are hundreds of thousands of OSS solutions easily available. Finding appropriate and commercially viable OSS applications can sometimes be challenging. Below are some ways to find OSS to suit your needs:

1. Case studies – speak to other schools, look at documented case studies:
 - Vendor case studies – Red Hat (RHEL), Canonical (Ubuntu) and Novell (Suse)
 - Educators tinkering with OSS – check out mailing lists and conferences – see more in the Support section
2. OSS for Education websites and projects:
 - OSS for Education Catalog – has many FOSS applications for education http://openeducation.org.au/wiki/index.php/Free_Software_for_Schools_Catalog
 - Edubuntu – derivative of Ubuntu specifically for education. Includes applications for the classroom and tools for schools. <http://edubuntu.org/>
 - The Education Open Disk – a collection of OSS applications for education that run on Windows <http://www.theopendisc.com/education/>
 - Schoolforge – lists of OSS applications and case studies. Slightly dated. <http://www.schoolforge.net/>
 - Eduforge – hosts development of some OSS education applications. “For the sharing of ideas, research outcomes, open content and open source software for education” <https://eduforge.org/>
3. Software available in your Linux distribution – if you are using a mature Linux distribution such as Ubuntu, Fedora or Suse, there will be an online repository of supported OSS solutions that you can easily install and know has good QA and commercial support (and thus is commercially viable). See “Add/Remove” in Ubuntu for an example.
4. Vendors and consultants – for professional support and advice. Even looking through industry websites for solutions will help you find commercially viable OSS solutions. You can find OSS companies through the Open Source Industry Association <http://osia.net.au/>
5. OSS solution sites:
 - Sourceforge – be aware that the majority of Sourceforge applications are unsuccessful. It is an online development platform, where many projects start. <http://sourceforge.net/>
 - Launchpad – has many new OSS applications <https://launchpad.net/>
 - Open Source applications for Windows <http://www.opensourcewindows.org/>
 - Open Source applications for Macs <http://www.opensourcemacs.org/>
 - The Open Disk <http://www.theopendisc.com/>

3. Integrating OSS Solutions

There are several options for integrating OSS solutions into your ICT environment.

OSS Desktop – The recommended desktop solutions would be either direct installation on the existing environment, virtualisation or terminal services to host OSS applications.

OSS Server – OSS server solutions are usually best hosted on Linux, but there are many solutions that run on other server operating systems including Windows, Macs & Unix.

3.1 Installing OSS applications natively on Windows/Macs

There are loads of OSS applications you can install on Windows or Macs. You can usually manage them the same as you currently manage applications on Windows or Macs.

3.2 Running Linux dual boot with Windows

You can install Linux alongside Windows and when booting the machine you can choose to boot into either Windows or Linux. Both the Linux and Windows environments can be remotely managed and installed.

3.3 Running Linux in a virtual environment

You can create virtual environments to suit whatever needs you have, which can be easily deployed by making a copy of the files. This way you have an environment ready to go that can be used and copied for teachers, students, etc. It also means you can have a generic server VM environment ready to deploy in seconds. The VMWare player (VMPlayer) is a free application (not OSS) that runs on Linux, Windows and Mac. The OLPC environment Sugar is available as a virtual image.

3.4 Running Windows applications under Linux

You can always gain the security and flexibility of a Linux desktop/server environment, while running Windows applications under Linux. There are four main ways this is achieved and either emulation or virtualisation are the recommended solutions:

1. Emulation – you can run many Windows applications under WINE, a Windows emulation environment to run individual Windows-based applications under Linux.
2. Virtualisation – you can run Windows under VMPlayer/QEmu and then run Windows applications in Windows under Linux. Often, Windows applications will run better virtualised under Linux than natively.
3. Replacement or porting – you can often find OSS versions of applications, or OSS alternatives for applications. It is not always viable. Often applications can be ported to Linux, however this is obviously the most difficult of the options.

3.5 Live CDs

Linux often comes on an optional live CD image that simply boots from CD and doesn't need to be installed and teachers simply boot from the CD to use. A live CD can be configured with applications like Reconstructor.

3.6 Linux Terminal Services Project

LTSP can be installed and then Windows clients can use an RDP client to run a session. Installed and configured by default on Edubuntu.

4. OSS Maintenance, Automation and Monitoring

OSS maintenance and automation are important for ease of ongoing support and sustainability of the solutions. Please find below some options.

4.1 OSS applications under Windows

There are several options for managing applications under Windows, not least of all group policies. You can package OSS applications for Windows in exactly the same way you'd package any application for Windows and then manage the applications through group policy or third party management tools.

4.2 Linux deployments and management

There are many options for automating management and deployment of Linux:

Profile configuration

There is a great tool in GNOME called Sabayon for configuring a user profile to have the right look and security for any individual or group of users. It is easy and intuitive to use and then the configured profile can be rolled out to users depending on the environment. Ultimately users can be locked down as much as desired.

Operating System Deployments

Linux can be deployed via PXE in a very similar way to Windows' RIS services.

Application Deployments on Linux

OSS applications on Linux can be deployed by management tools such as Red Hat's Satellite Server, by Kickstart or by third party tools. Puppet is an excellent tool for managing Ubuntu and Debian deployments and makes installing large numbers of computers trivial.

4.3 Monitoring tools

Some great OSS monitoring tools include:

- Nagios – for monitoring anything that you want, including server uptime, CPU/RAM/HDD, and much more. States for all monitoring items are normal, warning and critical and these are fully configurable for any item that needs monitoring.
- Cricket – for more detailed monitoring of servers and statistics.
- AWStats for website statistics – provides excellent graphs, data and reporting information on as many websites as you need. Google Analytics is also quite useful in some cases.

4.4 Troubleshooting Linux

Troubleshooting Linux requires some basic knowledge. Below are some basic tips:

- Many OSS solutions will have good documentation on troubleshooting the specific application. The Linux distributions will usually have a good help application
- The `/var/log/messages` and `/var/log/dmesg` log files contain most of the important system messages, so they are the first place to look for system errors
- Many applications can be run in debugging mode (usually `<application -d` or `-debug`) which will give additional log information
- Installing applications directly from the Linux repository is usually the best way to ensure a sane installation, whereas installing from packages downloaded randomly online, or building applications from scratch makes them harder to support and troubleshoot.

5. Support & Training

Support for OSS solutions comes in a variety of flavours, and you can choose to use whatever support models suit your needs.

5.1 Project Support

Often enough the specific OSS solution you are using will have good documentation, configuration options you can use and user/administrator guides to help you. Make sure you check out forums and mailing lists for information.

5.2 Broader OSS Community Support

OSS usergroups can be extremely helpful to both gain support and training about OSS solutions, but also to gain ideas and to learn from the lessons of others. It would be well worth encouraging some staff in any organisation using OSS to get involved in the OSS community for their own personal and professional interest as well as a way to bring into the organisation new ideas and expertise. Australian OSS communities can be found through Linux Australia (<http://linux.org.au>) and there are also several education focused OSS communities in Australia:

- OSS Education mailing lists
 - EduLists (<http://www.edulists.com.au/mailman/listinfo/opensource>)
 - ALLIES, LIAS (<http://lists.linux.org.au/>)

5.3 Commercial Support

You can get commercial OSS support from over 500 companies across Australia, see the Open Source Industry Australia members list for some of the top OSS companies in the country (<http://osia.net.au/members>).

5.4 Internal Support Tools

There are several OSS tools that may help with internal support generally:

- Wiki's – great for internal documentation and lowering the barrier for staff to participate in online data creation
- RT – task tracker for issue resolution
- Mailman – great mailing lists management application

5.5 OSS Training

Below are some certification and training options for OSS as well as some events and books recommended for OSS knowledge.

Certifications & training

LPI – Linux Professional Institute – currently the only distribution neutral Linux certification which broadly prepares students for Linux of different flavours. Not a strong practical element. Great LPI text books available including from O'Reilly.

RHCE – Red Hat certification, is distribution specific however has an excellent practical element and is a popular certification for Linux. Has some application to other Linux distros.

NCLE – Novell Certified Linux Engineer – a little too Suse specific, and very focused on the distribution specific management tool, YaST, and so not easily applicable to other Linux distros.

Training options include some TAFEs, Universities (ANU has a masters in FOSS coming soon), private trainers and more. There is also a yearly week long OSS conference called linux.conf.au which is an excellent opportunity for training and networking with the worlds best OSS minds.

6. Additional OSS Solutions for Education

Below are some areas where specific OSS solutions may suit existing PLC needs or bring new value.

6.1 Linux solutions

Client

- Ubuntu – excellent and user-friendly Linux distribution that has many thousands of applications, and is used all around the world. Also has Edubuntu, an education focused derivative. Acquire from <http://ubuntu.com/>
- Fedora/RHEL – Red Hat supported Linux distributions. Fedora is the community distro and freely available. RHEL is a Fedora snapshot with additional work to make it commercially supported. Is not freely available. Acquire from <http://fedora.org/>
- Suse – Novell supported Linux distribution. Acquire from <http://www.novell.com/linux/>
- Linux Terminal Services Project – You can deliver any Linux to clients using LTSP on the server and a terminal services client on the desktop. Install through the package manager in any of the above Linux distributions.

Server

All three Linux distributions above can be also used as a server, however servers should only have what they need to deliver services to reduce any security risks and to reduce the impact on resources (CPU, RAM, etc). Virtualisation can help make the most of hardware resources rather than multiple hardware platforms with resources being wasted.

6.3 Teaching solutions

There are loads of OSS applications for education.

Tools for online courseware

- eLearning – Moodle

Tools for teaching

- Animation and graphics
 - Alice 3d
 - Scratch
 - Synfig
 - Gimp (with plugins)
 - Inkscape
 - Stopmotion
 - Ktoons
 - Blender 3D – advanced
- Video
 - Cheese – simple and fun app for webcams
 - Kdenlive – video
 - Kino - video
- Music

- Audacity
- Sweep
- Open Knowledge
 - Wikipedia
 - Blip.tv
- Games development
 - Scratch
 - Pygames
 - Wesnoth – easy to edit RPG
- Web development
 - Content management systems (Drupal, Mambo/Joomla, Plone)
 - Blogging (Wordpress – can also be used for websites)
 - A website with web development lessons from Google
<http://sites.google.com/site/webdevedu/>
- Maths and science
 - Gcompris
 - TuxMath
 - TuxType
 - KGeography

6.4 Some infrastructure solutions

- Wordpress – blogs, webpages, media – create a school news centre with the students contributing stories. Highly configurable and simple to use.
- Netbooks
 - Ubuntu with Netbook-remix UI – simple to use, secure (low risk from viruses/spyware), and many applications available.
 - Puppet – management and configuration management
- SAMBA – for File and Print servers, and to interact with Window domain and AD
- Asterisk – VoIP solution
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