A HANDBOOK ON

MIGRATION OF DESKTOPS TO FREE SOFTWARE PLATFORMS

ICFOSS

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Published by the International Centre for Free and Open Source Software, VII Floor, Technopark, Trivandrum-695581, Kerala, India, for the purpose of assisting individuals and organizations to migrate to Free Software Platforms. Kindly send any comments or suggestiosn to info@icfoss.in by email.

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Background

This handbook has been created by ICFOSS as a guideline for the migration of Desktop computers from proprietary to Free Software platforms. It is for use primarily by the Government departments, institutions and PSUs of the Government of Kerala, but can also be used by any institution or individual who desires to migrate to Free Software platforms.

Comments are invited on this document from readers and Free Software community members, to further enhance it. Kindly send your comments to info@icfoss.in

Introduction

The Government of Kerala, in its Order no. 109/2014/ITD dated 17 May 2014, made a strong recommendation for migrating desktop machines of all Departments, Institutions and PSUs, to Free Software (FS) platforms in the backdrop of the withdrawal of support to Windows XP.

This document has been created to support the process of migration of desktop computers that currently use proprietary platforms over to Free Software platforms, with minimal disruption to work or data. It can also be used to support commissioning of new desktop computers in Free Software platforms.

This document discusses only the migration of Desktop machines and not back-end applications or Internet- or Cloud-based services[1].

[1] There are numerous other services where Free Software platforms may be deployed in a robust, cost-effective and freedom-enabling manner, including DHCP, DNS, NTP, Directory Services, Authentication Services, File Services, Print Services, Email and Messaging Services, Groupware and Calendaring Services, and Web Services. These services are *not* covered in this document

Can it be done?

A basic question that is often posed is that while migration to Free Software platforms for the individual or small groups is possible and easy, whether the same can be said of large institutions, particularly the Government. The answer to this question is that such migration can indeed be done, provided a structured and systematic approach is followed. The following points illustrate this further:

First, the Government of Kerala embarked on its policy of migration to FS platforms several years back, and many departments have already carried out this transition successfully. In fact, the Government of Kerala is credited as the first Government in the world to announce affirmative support for FS platforms in its state IT policy. (See: https://en.wikipedia.org/wiki/List_of_Linux_adopters). Therefore, there is expertise within the Government system in Kerala to address the migration. ICFOSS itself has been set up by the Government of Kerala to provide support for, *inter alia*, such movement into Free Software platforms.

Secondly, some of the projects in Kerala have demonstrated large-scale movement to GNU/Linux. For example, the IT@School project is considered widely as the largest single-purpose deployment of FS

platforms globally. Initiatives such as Kerala State Electricity Board (KSEB), Calicut University and several others launched in Kerala in the last decade, are considered as significant achievements.

Thirdly, there are some very successful large-scale migrations in other parts of the world. A good example is **LiMux**[2], a project by the city of Munich to migrate their software systems from closed-source, proprietary platforms to Free Software. The project, involving migrating 15,000 personal computers and laptops of employees to the GNU/Linux distribution LiMux (an Ubuntu derivative) as the operating system, and LibreOffice as the primary productivity software, was successfully completed in late 2013. Notably, this migration is estimated to have saved the city of Munich a sum of 11 million Euros (approximately Rs 88 crores)[3].

Any large-scale migration of this kind carries with it risks which need to be carefully evaluated and mitigated. Migration to a FS platform is not a "fit-and-forget" process, but requires evaluation of the desktop installation in each enterprise, identification of problematic areas (legacy hardware, desktop applications, training & capacity development requirements, to name a few), developing a migration plan, and determining mitigation measures[4].

[2] See https://en.wikipedia.org/wiki/LiMux

[3] Please see IT World report available at: http://www.itworld.com/operating-systems/321474/switching-linux-saves-munich-over-11-million

[4] There have been several failures reported in migration to FS as well (for example, Vienna, Birmingham, and Solothurn Canton cities). These have been attributed to factors such as lack of internal cohesion, half-hearted implementations, internal sabotage, and pressure to complete the process too fast (as opposed to doing it right).

Migration Strategy

The broad strategy for migration is summarized in the following steps:

1. Equip internal IT teams to plan the migration (in case there is no internal IT team, identify a service provider or technology partner who would provide assistance for the entire process).

2. Inventory the installation (number and configuration of PCs, devices and applications) and create an initial plan for migration.

3. Back up all user data (including application data, email, documents etc) on existing machines to back-end, offline media or the Cloud.

4. Choose an appropriate GNU/Linux Distribution keeping in mind the requirements of the organization.

5. Enumerate the legacy hardware (old desktops, printers, scanners etc) and determine which have compatibility issues with the chosen distribution.

6. Enumerate the legacy software applications and identify which of them cannot be used on the GNU/Linux distribution directly or indirectly. This may include local applications (eg., browsers, office suites) and networked applications (file/print sharing, browser-based applications, client-server applications and networked applications).

7. Map the Windows desktop applications used in the system to available FOSS equivalents (See Section , Item on Page 12). Consider piloting alternatives before finalizing.

8. Categorize the installation into three groups: (a) the desktops that can be immediately migrated; (b) those that require low-effort porting; and (c) those that cannot be moved immediately due to various reasons.

9. Plan and implement the installation of the chosen distribution and the capacity building and training programmes for users as well as IT staff in a synchronized fashion. In particular, equip users to handle immediate and routine tasks such as browsing, printing, booting, and handling documents. Another priority area is to equip users to know the differences between FS office applications (LibreOffice, OpenOffice) and proprietary applications (such as MS Office) for routine tasks.

10. Set up a Helpdesk (internal or external) for hand-holding new users.

11. Review progress periodically and if there are significant issues, seek external resolution.

Possible Issues and Mitigation Measures

While the vast majority of general purpose PCs (ie., those that use only browsers and office suites) should be easily migrated to FS platforms, issues may arise in the context of specific installations on account of the kind of hardware, devices and applications used. These issues are summarized below (this is not an exhaustive list):

PCs with obsolete hardware configurations

These use old motherboards & CPUs and have limited amount of RAM and hard-disk space, which makes it difficult to install some of the latest FS desktop distributions. It is best that these machines are retired. However, if these machines cannot be replaced, then there are special-purpose low-resource GNU/Linux distributions that could be used.

Older hardware devices

These include some of the older printers, scanners, and some incompatible internal devices such as network cards and sound cards. Some of these devices do not work with any FS platform because there are no FOSS drivers available for them. Drivers may be available for other devices that may that provide partial functionality as a workaround (see the note below on buying new machines and devices).

Browser-based custom applications

Most browser-based custom applications should work without any modifications after desktop migration. However, there may be minor incompatibilities on account of JavaScript implementations, particularly on browsers such as IE 6.0 (which has been declared as obsolete, but are still used by some).

Custom Client-Server Applications

Some custom client-server applications (such as those built on Visual Basic/SQL Server) may work on FS platforms on Wine (Windows Emulator); similarly, many MS-DOS applications would work on DOS Emulators (such as Dosbox). However, the use of emulators is recommended only as a transitional measure as the may impair performance. It may be worth porting such applications to 3-tier/web-based application as this architectural pattern is already obsolete.

Desktop Applications

Most or all desktop applications may need to be changed, although some may work on Wine. The good news, however, is that almost 90% of applications have FS equivalents which may be downloaded and installed with little effort. Lists of FS applications are available online[5].

[5] Pls see https://en.wikipedia.org/wiki/List_of_free_and_open_source_software_packages for a list. Several others are available on sites such as SourceForge and FreshMeat. For those interested, a list of "liberated" applications (originally proprietary, but later relicensed under a FOSS license) is available at https://en.wikipedia.org/wiki/List_of_liberated_software

LibreOffice/OpenOffice vs MS Office

LibreOffice (LO) and OpenOffice (OO) are both considered as equivalents to the MS Office suite. While LibreOffice is maintained by the community, OpenOffice is maintained presently by Apache Software Foundation. Both applications can open, edit and save documents in the proprietary format used by MS Office. However, the native formats of LO/OO follow Open Standards, which makes it much more sensible to start exchanging documents in these formats rather than the proprietary format of MS Office. There are some incompatibilities (formatting, fonts) when converting between MS Office formats and these. If the document contents are final, it may better use PDFs when exchanging files with others.

PDF creation

FS platforms provide built-in tools for creation of PDF files from LO/OO (or any other) documents, and no third-party software is required.

Malayalam Computing

A full stack for Malayalam computing (entering text, editing, formatting, printing) is available on LO/OO as well as more advanced applications (Scribus, Lyx, LaTeX). More details are available on request.

Anti-Virus Software

So far, there is no evidence of 'viruses' or other malware of the types found on proprietary platforms on GNU/Linux. Further, if GNU/Linux desktops are used with the usual precautions (for instance, never work as superuser but only as an ordinary user), it is exceedingly unlikely that any malware can penetrate a GNU/Linux system. Consequently, GNU/Linux desktops do not require anti-virus software at this time[6].

[6] There have been some root kits available for GNU/Linux, but if the usual precautions are taken, these should not have any impact. However, it is to be noted that any email-embedded virus can be propagated by a FS desktop if the user forwards the mail to others, as the desktop does not scan any attachments. Further, GNU/Linux gateway servers do have virus scanning enabled, but this for protecting their Windows desktops in the local network

Buying new PCs/Devices

When buying new PCs, it would be prudent to first check if they are supported on FS platforms by drivers. Several manufacturers make these available, while other drivers are developed by third-parties. Please also note that some new laptops (especially those that use the very latest, first-generation technologies) may not be fully supported by FS platforms as the community has not had sufficient time to develop drivers. In these cases, drivers will be available eventually, but will take time. There are also cases where hardware manufacturers have released FS drivers even before the hardware itself is released (these are companies that proactively support Free Software). Further, some of the local vendors also provide services to determine device and hardware compatibility which could also be used. Finally, efforts by Governments can persuade manufacturers to provide FS drivers for their products[7].

[7] The Government of India, in its draft policy on the Use of FOSS for eGovernance, mandates that all hardware used for e-Governance require that they are provided with FOSS-based drivers by their manufacturers

Choice of Distributions

There are several general purpose distributions available for free download, such as Debian, SUSE, Fedora, Mandriva, Ubuntu, Chakra, Arch and Mint. The choice of a distribution is usually made considering factors such as licensing policies, ease of use, style of graphical interface, support policies, presence & size of local communities, and predominant purpose, as applied to each user organization. Rather than recommend a particular distribution, this document leaves the choice to the implementing organization, which can choose one based on its specific requirements.

Virtualization

It has been pointed out that Virtualization may be used for running Windows applications, but creating a virtualized Windows instance on a FS host. While this is certainly possible technologically,

it doesn't appear to a sustainable or legally valid option. The reason is that a valid copy of Windows would still be needed to create the virtualized instance.

Capacity Building and Training

There is anecdotal evidence that users exposed to FS platforms as their first computer platform, do not face any difficulty in becoming productive[8], as compared to users who migrate from other platforms. This points to the need for retraining users and building capacity within enterprises to support the migration.

While structured training guides are available online (including a detailed guide from Ubuntu's Desktop Training project which seems to be suspended now), there are several fundamental differences between Windows and GNU/Linux platforms that users need to be aware of, in order to avoid frustration. Some of these are listed below:

[8] Projects such as IT@School expose FS to school students who are first-time users. It has been observed that in the course of a few months, students not only become highly productive, but that they also take up advanced tasks such as web page design and non-linear editing

Operational Differences

- There is no concept of drive volumes (C:\, D:\ etc) in GNU/Linux. The directory system has exactly one root. This requires somewhat different procedures, particularly when using removable devices such as USB drives, cameras and DVDs.
- In FS, if you don't like something, you can usually change it[9]. If you are not a programmer, someone else in the community can change this for you.
- Multilingual support is built-in in most distributions such as Ubuntu or Debian. Language packs may need to be downloaded for this to work.
- If basic security precautions are followed (for instance, always use the user account and not the 'root' account), the design protections of Unix ensure that malware cannot penetrate the system. This is why computer viruses find it difficult to propagate in FS platforms.
- There is an increasing tendency for users to do their work using web applications, which largely run within the browser. In this case, changing the operating system does not impact the user at all, provided there is a browser in the new system.

[9] See the section on Strategic/Philosophical differences on Page 16 for reasons why there are multiple options for GUI styles in FS platforms

- Some hardware—either very old, or very new—may have difficulty working with FS platforms. In the case of very new hardware, the FS community may write drivers eventually. For legacy hardware, this is unlikely to happen.
- There are specialized distributions that run on resource-limited hardware, such as 386 or Pentium machines with limited RAM.
- The way new programs are installed is usually different on GNU/Linux compared to Windows.
- FS platforms usually assume that users have full-time access to the Internet, particularly as it is considered a good idea for systems to be continuously updated. There are work-arounds if this is not possible (such as periodic upgrades from a USB disk).
- The Command Line in Unix is a very precise and fast way to enter commands, and power users usually prefer it to GUIs. Windows users are usually not familiar with the command line.
- Internet search engines and community support sites may be the easiest ways to get answers if you don't have an expert nearby.

Strategic/Philosophical differences

- Modern FS platforms are built on top of Unix, which is a stable, mature operating system that has been around for over 30 years Unix is used by most large enterprises (such as Universities, banks, Internet Service Providers and Governments) and has been vital to the Internet from its early days. The Unix philosophy is minimalist and terse. GUIs are relatively recent add-ons to Unix. Since they are add-ons, users can remove GUIs or replace bundled GUIs with others.
- Free Software is about *communities* as much as it is about software. Communities build, maintain, support, promote, advocate and drive the development of Free Software. This is the reason Free Software success usually involves the entire ecosystem of that particular software. This ecosystem includes programmers, businesses, users, testers, document writers, trainers, and consultants, with some people playing multiple roles.
- Free Software is free as in "Free Speech". For most part, it is also free as in cost-free, but this is not always necessary.

Further Work

This document is meant to be evolved over a period of time while remaining useful at any instant. Comments are invited from the community as well as anyone else who would like to contribute so that these guidelines may be improved (comments may be sent by email to info@icfoss.in). Comments received would be vetted and those considered useful would be incorporated into the document.