

Using Free Software in E-Governance

Raj Shekhar

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1 Introduction

As part of the recommendations for the Tenth Five-Year Plan (2002-07), the working group on convergence and e-governance has earmarked an investment of Rs 2,680 crore, out of which Rs 1,830 crore is for convergence and Rs 850 crore for e-governance. This clearly shows that the Indian government acknowledges the significance of IT in furthering economic development. Most successful economies the world over have made significant investments in IT and integrated development processes.

There are four cornerstones for supporting e-governance: hardware, software, training and support. Broadly speaking, software is a self-contained environment for performing some well-defined task such as word processing . For example, a word processor such as Microsoft Word 2000 is software, whose job is to aid the job of writing letters, articles and other word processing jobs. Similarly, there is software to draw graphs and to forecast weather.

Software is the enabler that has helped markets to reach their current levels of effectiveness. It has made new ways of doing business and connecting people possible.

2 Free Software

The term Free software was coined by Richard Stallman. The Free in "Free software" has nothing to do with price. It is about freedom. Free software gives users the freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:

The user can run the software for any purpose.

The freedom to use a software means the freedom for any kind of person or organization to use it on any kind of computer system, for any kind of overall job, and without being required to communicate subsequently with the developer or any other specific entity.

The users have the freedom to study how the software works, and adapt it to his needs.

Software developers typically deliver software that is a black box. The users cannot study or change it. Free software provides access to the source code for the software to the users. They can read, fix, adapt and improve, not just operate the software.

The users have the freedom to redistribute copies of the software.

Typically, software developers/sellers get revenue by selling the customer the right to use the software product as opposed to selling them actual ownership of the product (as they might own a physical object like a book). In contrast to this, when a user uses free software he has the freedom to redistribute copies of the software, as well as source code, for both modified and unmodified versions. The users can distribute the software either gratis or charging a fee for distribution, to anyone anywhere. The users do not have to ask or pay for permission from the software developers.

The users have the freedom to improve the program, and release his improvements to the public.

A software is free software if users have all of these freedoms. As we see, *Free software* is a matter of liberty, not price.

2.1 Free Software

Foundation To promote the use and development of free software, the Free Software Foundation (FSF) was founded in 1985. Many organizations engage in distributing and selling free software, however the Free Software Foundation concentrates on development of new free software and on making that software into a coherent system that can eliminate the need to use proprietary software. The FSF also protects and preserves free software from infringement by unscrupulous parties.

2.2 Open Source Software

Some people prefer the term Open Source Software instead of free software. The idea behind using this term is to emphasize that the source code to software is freely available; however, a company can still charge a price for distributing the software. Note however, that open-source software is still "free" software in the sense that no license fees are charged for use or redistribution, as well as in the sense that users are free to modify the source and create and distribute derivative works.

2.3 Softwares available as Free Software

Quite a lot of free software are available and you may have used many of them unknowingly. A few well known are given below:

GNU/Linux Operating System (also known as Linux)

GNU/Linux Operating System is a very popular operating system used in running the Internet and in mission critical environments. GNU/Linux has also been deployed in commercial environments as well as on personal desktops with an excellent pool of public testimonials.

GNU Emacs

Originally, a powerful character-mode text editor, over time Emacs was enhanced to provide a front-end to compilers, mail readers, etc.

GNU C Compiler (GCC)

GCC is the most widely used compiler in academia & the in the production of free software. In addition to the compiler a standardized set of intermediate libraries are available as a superset to the ANSI C libraries.

GNU GhostScript

GNU GhostScript is Postscript printer/viewer

Apache

Apache is the most popular server software on the Web

BIND

BIND (Berkeley Internet Name Daemon) is the de facto DNS 2server for the Internet. In many respects, DNS was developed on top of BIND.

Sendmail

Sendmail is the topmost mail transfer agent on the Internet today.

The list is a very small percentage of the most popular softwares available. Most of the softwares are freely available from websites or from vendors on payment. North Carolina's Metalab (formerly Sunsite) (<http://metalab.unc.edu/pub/Linux/welcome.html>) is the largest and most popular software archive in the Linux world.

3 Relevance to India

Adopting free software in e-governance can be a major decision for a government. The decision should be based on factual evidence. Given the visibility associated with omissions and commissions of a government, it can be a lot trickier for the government to switch from proprietary software to the rather new approach of free software. Thus before doing anything else, the question: "Do I really need or want to do this?" should be clearly answered.

3.1 Economic advantages of Free Software

While implementing any policy, the major concern most times is financial. However, these days there is no dearth of investment funds in IT systems. In 2000-01 alone, government expenditure on IT was Rs. 556 million. Nevertheless as customers to the software developers, the government should try to procure deal that is beneficial to the citizens as a whole.

3.1.1 Price difference between Free and Proprietary Softwares

Many applications that are free softwares are available as free downloads from their developer s websites. Many are available to the users from distributors on a CDROM for a fee. Here I would like to compare the prices of RedHat Linux 7.3 and Window XP Home Edition. Before proceeding, I would like to make clear what RedHat Linux is. Linux is a free operating system. The core or the kernel of the Linux operating system is freely available to anyone from a number of websites. Many companies package the Linux operating system together with a set of applications, utilities, tools and driver modules and can offer different installation and upgrade programs to ease the management of the system for the user. The final products of these companies are known as distributions. RedHat is the most popular Linux distribution.

	RedHat Linux 7.3 Personal Edition	Microsoft XP Home Edition
Price	Rs. 3550	Rs. 3300

Included software	Full version of the Sun StarOffice 5.2 Office Suite, Evolution a comprehensive personal management system that integrates e-mail, calendar, and contact information functionality, MrProject open source project management software, Complete Web, mail, ftp, file and print servers , BIND, DBMS like MySQL, PostgreSQL, complete software development suites, music and video players, CD writing software, games	Outlook email, contact information, music and video players, CD writing software, personal web server, games, text editor
License	One copy of the software can be used by any number of people	One copy of the software is required per user

Even though the prices are not much different, RedHat Linux comes bundled with all the software necessary to run a fully networked office using just one copy of the RedHat Linux. Most of the free softwares are either freely (zero-price) downloadable from their developers website or are priced much cheaper than their proprietary software counterparts.

Moreover, a single copy of the software can be used on any number of the computers. This saves cost on buying licenses of the same software repeatedly. A South African Government Advisory body, Government Information Officers' Council (GITO), had expressed some alarm about the amounts of money that government is spending on licenses. Even though no such study has taken place for India but spending on licenses would be considerable. The cost on software licenses will start pinching once India starts implementing IPR (Intellectual Protection Rights) protection in earnest, to which it has committed itself.

3.1.2 Proper Utilization of Available Human Resources

India has excellent capacity in a number of scientific and technological areas including software development. In respect of the jobs generated by proprietary software in countries like ours, these mainly concern technical tasks of little aggregate value like providing support for proprietary software produced by multinational companies. They do not have the possibility of fixing bugs because they do not have access to the source code to fix it (and not because of a lack of talent or expertise) .

The money spent on buying support from foreign software vendors can be used to pay Indian developers to provide support for the installed base of free software in the government. Since the source code of free software is available to the user there is a decreased dependency on imported technology and skills. Moreover, the funds spent of getting support remains inside the country itself.

3.2 More reliable

Reliability of software is one of the primary requirements for the state. However, the terms such as "rocksolid" and "fail-safe" cannot be used to describe the proprietary softwares.

Up to now, the reliability of most software has been atrociously bad. However, the foundation of free software is high reliability. All the running gears of the Internet – TCP/IP, DNS, sendmail, Perl, Apache are free software.

These free softwares have demonstrated a level of reliability and robustness under rapidly changing conditions (including a huge and rapid increase in the Internet s size) that, considered against the performance record of even the best of closed commercial software, is nothing short of astonishing.

I would like to present the case of Roger Maris Cancer Center in Fargo, North Dakota that uses Linux-based GNU systems precisely because reliability is essential. A network of GNU/Linux machines runs the information system, coordinates drug therapies and performs many other functions. This network needs to be available to the Center s staff at a moment s notice. According to Dr. G. W. Wettstein

The proper care of our cancer patients would not be what it is today without [GNU/] Linux ... The tools that we have been able to deploy from free software channels have enabled us to write and develop innovative applications which ... do not exist through commercial avenues.

It is impossible to prove is that proprietary software is more reliable than free software, without the public and open inspection of the scientific community and users in general. This demonstration is impossible because the model of proprietary software itself prevents this analysis, so that any guarantee of security is based only on promises of good intentions (biased, by any reckoning) made by the producer itself, or its contractors. It should be remembered that in many cases, the licensing conditions include Non-Disclosure clauses that prevent the user from publicly revealing security flaws found in the licensed proprietary product.

The reliability of free software is not a chance. Precisely because the source code is open for inspection by anyone, users can go over it and thoroughly examine it. If he finds the software lacking in some areas, he can make changes to it. Free software encourages its users in reporting bugs, fixing bugs and sharing the fixes with all other users. The effort spent in getting some software working correctly profits everyone who uses that software.

3.3 Security

To guarantee the security of the State, it is indispensable to be able to rely on systems that guard against unauthorized control from outside. The system should also protect undesired transmission of information to third parties. Privacy of citizens would be compromised if information about them with the Government gets into the hands of interested parties.

Incase of proprietary software, Government is not in possession of the source code. It cannot be sure of what the software does and what security problems can arise from the use of the software. Paradoxically, availability of the source code is the main reason why free software can offer greater protection against unauthorized attacks. Customers of proprietary software are supplied a black box and have to trust that there is no hidden *spy code* in the

software. However, free software enables every user to inspect the code and thoroughly examine its quality. This means that free softwares, with source code freely accessible to the public, can be inspected by the State itself or by the citizens, and by a large number of independent experts throughout the world. This eliminates the presence of spy code from the software.

The approach of security through obscurity just does not work. Proprietary software does three bad things:

1. They create a false sense of security.
2. They mean that the security conscious users will not be able find holes and fix them.
3. They make it harder to distribute trustworthy fixes when a hole is revealed since Non-Disclosure clauses prevent the user from publicly revealing security flaws found in the licensed proprietary product.

The enhanced security and stability, rather than the fact that it is free has attracted businesses and governments to free software.

3.4 Better support

One of the most important reasons for buying commercial software is the support they promise. However, the support is free only for some time. To continue getting support after the expiry date, the customer has to pay for it. Technical support from the commercial vendors is uneven technically and may be unavailable unless subscribing to a *premium service*.

Free software thrives on community-based support. Free community-based support is so good for Linux that it received the InfoWorld award for "Best Technical Support" in 1997. Usually, vendors like Red Hat and Suse support their products well. In addition, third-party commercial support is available for many free softwares from many companies, including HP and IBM.

When using free software, there is no lock-in with a particular support provider. Because the state can get access to source, it can review the software. Bugs and unwanted features can be removed without depending on the software vendor. In addition, the state is not shackled to every strategic decision the vendor makes.

Free software is also about competition, choice and putting power in the hands of the consumer. In the competitive service model of free software support and maintenance can be freely contracted out to a range of vendors competing on the grounds of quality and low cost. If the support fees of a vendor become steep, the government can switch to a different vendor or look for support provided indigenously.

3.5 Freedom from Legal Entanglements

Using most commercial software involves software licenses, and tracking software copies and usage. Licensing arrangements can be overly complicated. This demands record keeping, and legal exposure. Both raise costs. Thus, juggling software licenses and copies is an expenditure and legal risk to the government.

In many cases, such tracking is imperfect. Any such imperfection exposes the government to legal actions. The alternative presented by free software in general is refreshingly simple

by comparison: users may use and distribute free software as much as they like, free of charge, forever. Free software licenses allow you almost total autonomy when it comes to how you want to use your source code.

3.6 Permanence of data

The state archives, handles and transmits information which does not belong to it, but which is entrusted to it by citizens. The state should take extreme measures to safeguard the integrity, confidentiality and accessibility of this information.

If the whole infrastructure of the state is based on proprietary data formats, the government as well as the citizens stay *trapped* in the need to continue using products from the same supplier, or to make the huge effort to change to another environment (probably also proprietary). As the Government proceeds to acquire more data using proprietary software, a day may come when private suppliers withdraw their support for their products. Thus, much of data can become unusable or costly to port to other systems

This scenario is not as far-fetched as it may seem. For a direct interaction between citizens and the government, a simple yet effective tool called Fast Reliable Instantaneous Delivery of Services (FRIENDS) was implemented in Kerala. Citizens can make utilities and other payments like property and road taxes at a FRIENDS center instead of queuing in front of offices. The software for FRIENDS project was developed with seed money from the Microsoft India. The copyright claims of the private company that actually developed the software and the raid by Crime Branch in the office of the company engaged for the development of the software for the second phase of the project hit the initiative. The Government has spent considerable amount for the simple software that the FRIENDS employed. Now, it may have to develop software for the second phase from the scratch if the claims of company that developed the original software holds. This case clearly shows that the government had become dependent on the goodwill of the supplier for the maintenance of the software.

This dependence could have been avoided by using free software. Free software would guarantee the permanence of public data as the Government would not be dependent on any single supplier for updates and future usability of data.

A related problem of using proprietary data formats is the subsequent *lock-in* of the government and the citizen. Lock-in happens when you buy a product that restricts your future choices. Companies like the Microsoft keep on changing formats in which data is stored. For example, the format used for storing documents in Microsoft Word 2000 is different from that used in Word 97. This forces the users to upgrade the systems just for compatibility with everybody else. If the government uses proprietary data formats then the people who access Government data would also be forced to buy specified software products and update them frequently. On the other hand, standard and open format would guarantee continued access of Governmental data by the public without high recurring costs.

3.7 Conclusions

India needs free software if it has to have any chance of developing anything but an illicit software industry. Though the free software may not be necessarily free in all cases, one is free to copy it and there are no stringent licensing requirements.

Most of the free software requires lesser resources such as memory and processor speed to run, thus reducing hardware costs. Thus, the Government stands to save funds, both in hardware and software.

When free software is used, the government does not have to wait to get a bug fix. It does not have to publish changes in source code or to seek permission from some company to make a change in the software. These are attractive features for cases where you are threatened by cyber warfare and cyber terrorism.

4 Countries Using Free Software

On August 30, 2002 Venezuela, the South American nation announced an official policy that exclusively calls for the use of free software in their government^H. The entire policy was summed up in this statement by Dr. Felipe Prez-Mart, Planning and Development Minister: "Open source whenever possible, proprietary software only when necessary." According to Prez-Mart, the government and the people of Venezuela were increasingly concerned that over 75 percent of the funds for software licenses went to foreign nations, 20 percent to foreign support agencies and only 5 percent to Venezuelan programmers.

The German government uses GNU/Linux operating systems to run application software for the German parliament. GNU/Linux runs France's culture, defense and education ministries and is in use in the British police and intelligence agencies. In South Africa, the Government Information Officers Council (GITO) recommends that government "explicitly" support the adoption of free software as part of its e-government strategy.

A group of Finnish MPs have signed a bill requiring national and local agencies to migrate their IT systems to the GNU/Linux operating system. The bill, according to Finland MP Kysti Karjula, is not a legislative act. In Finland, general bills such as this are meant to act as encouragement to the government at-large. The Ministry of Finance has estimated that annual savings of 26 million euros could be made by using Linux in state agencies. Several towns in Finland are already planning to move their IT systems to GNU/Linux^I. Brazil and Argentina moved to GNU/Linux because of threats from proprietary software owners. The Chinese government has consistently promoted its local software based on GNU/Linux, both for cost reasons, and reportedly for 'security' concerns as well.

5 Conclusions

Free software is ideal for a country such as India, especially in the e-governance area. It has the practical advantages of costs savings, better reliability and security over proprietary operating systems. Though India has made a name for itself selling solutions, software as a product is expensive within the country.

Though the free software may not be necessarily free (zero-price) in all cases, one is free to copy it and there are no stringent licensing requirements. Not only can the government cut costs, it can do a better job. The service improves while lowering costs.