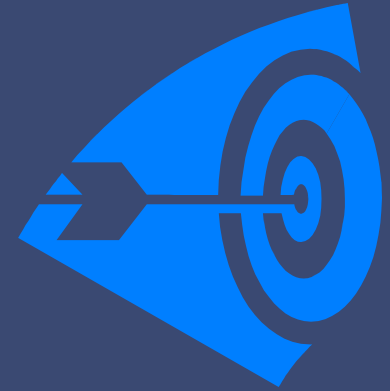


Course: Enterprise Applications and Open Source Systems for e-Governance implementation

Day 3

Session 4: Introduction to Open Source Systems

Agenda



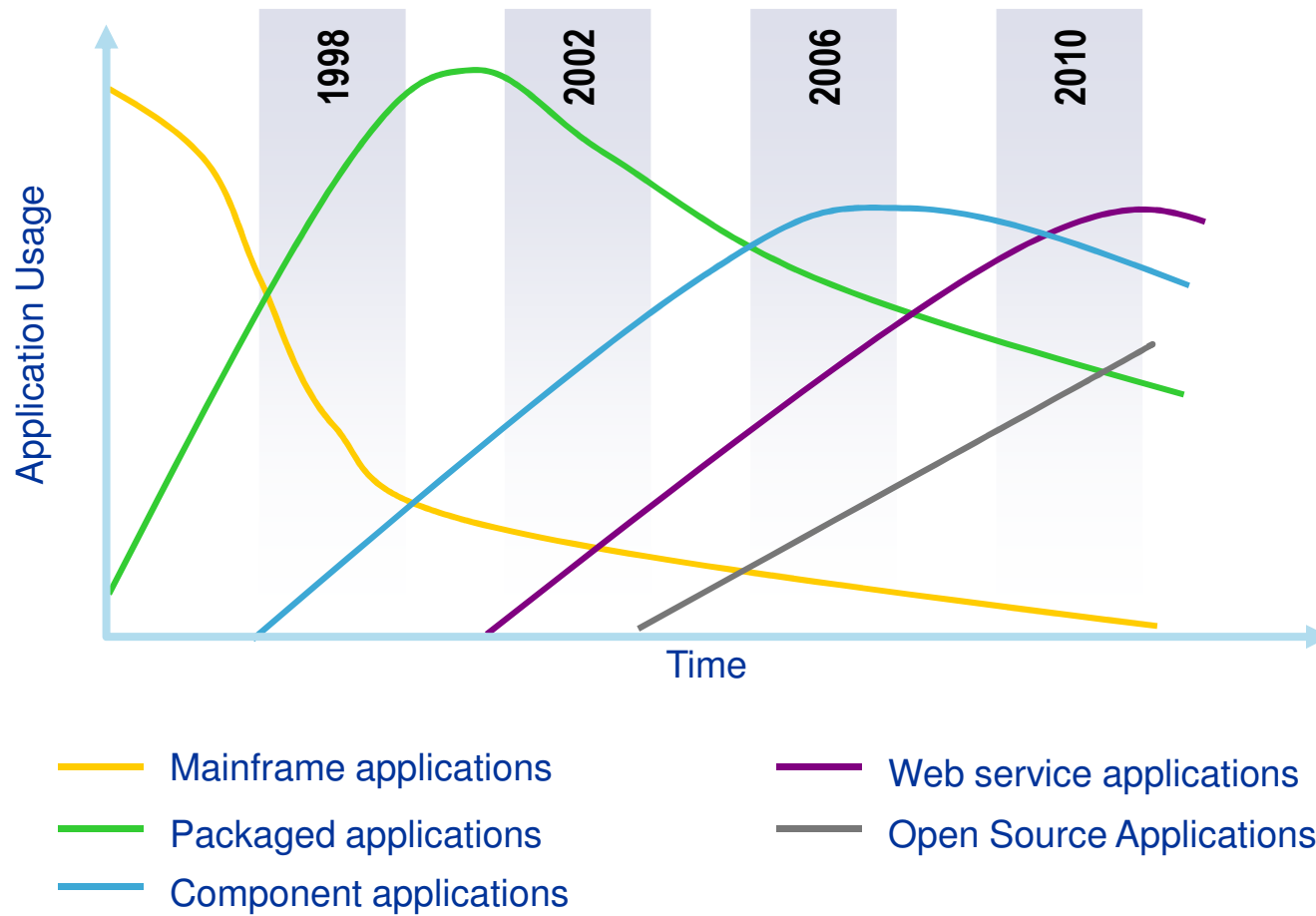
- Definitions of Open Source systems, open source standards , drivers & applicability of open source
- Open Source vs. free software vs. custom developed applications
- Importance of Open Source systems in Organizations - Total Cost of Ownership
- Example where open source systems can be used (positioned) for better Return on Investments

Open-Source in India

In the year 2010, if FOSS is adopted at 50 per cent levels across the economy, India can save around \$2 billion (around Rs 9,800 crore), suggests a study conducted by the Indian Institute of Management-Bangalore.

[Source: http://www.business-standard.com/india/news/open-source-software-can-save-india-2-bn/369858/](http://www.business-standard.com/india/news/open-source-software-can-save-india-2-bn/369858/)

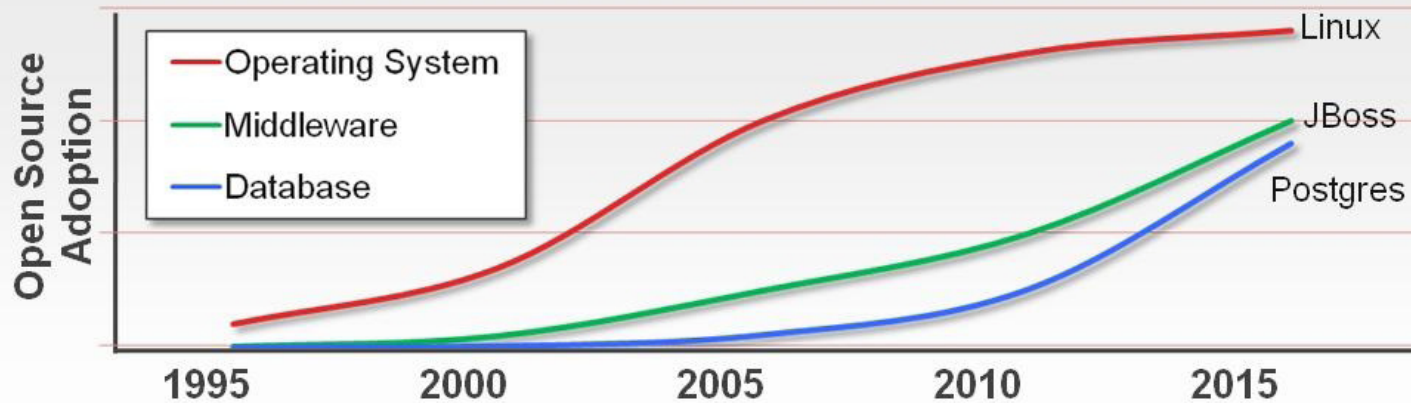
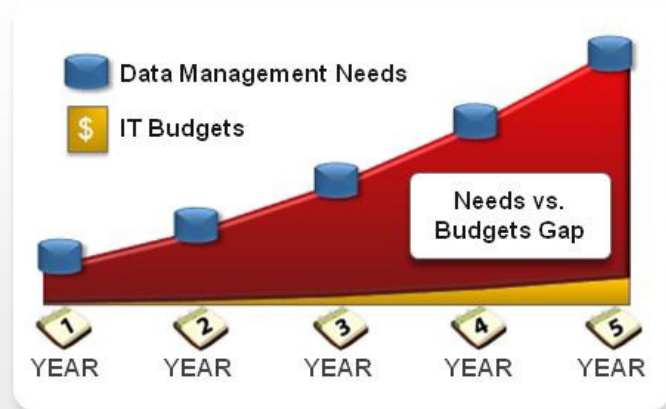
Technology Architectures



Source: PwC 2002 - Technology Assessment

Doing More with Less

- » Growth in data is exploding, fueled by Web apps, compliance and BI
- » Proprietary database vendors have no motivation to change
- » Needs vs. budgets gap is unresolved and rapidly getting worse

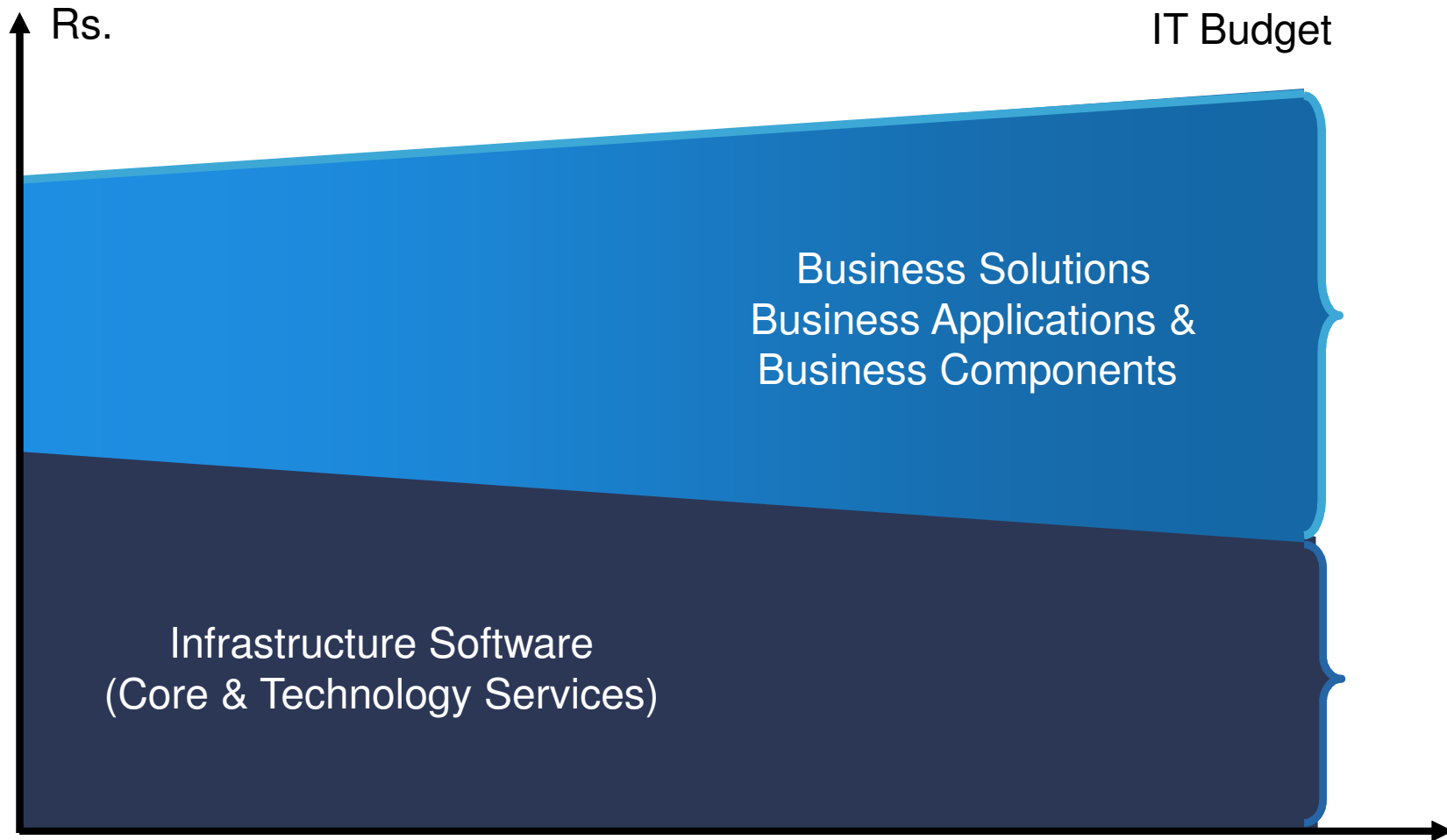


Source: Red Hat Summit 2009

Why would Governments use or create Open Source Software (OSS) - Value for Governments?

$$\text{License Fee} + \sum_{y=1}^N \text{Annual S\&M}$$

Why would Governments use or create OSS (value for Government)?



Why would Governments use or create OSS (value for Government)?

- Can evaluate in detail, lowering risk
 - Can see if meets needs (security, etc.)
 - Mass peer review typically greatly increases quality/security
 - Aids longevity of records, Government transparency
- Can copy repeatedly at no additional charge (lower TCO)
 - Support may have per-use charges (compete-able)
- Can share development costs with other users

Why would Governments use or create OSS (value for Government)? contd..

- Can modify for special needs & to counter attacks
 - Even if you're the only one who needs the modification
- *Control own destiny*: Freedom from vendor lock-in, vendor abandonment, conflicting vendor goals, etc.

In many cases, OSS approaches have the *potential* to increase functionality, quality, and flexibility, while lowering cost and development time

Why would Governments use or create OSS (value for Government)? contd..

For many Governments the world over, the choice of Open Source is a strategic one.

- The preference towards Open Source platforms is firstly because, acquiring and upgrading proprietary software is expensive.
- There is also the proposition that it is safer to entrust knowledge in the public domain to Open Source, which is also in the public domain, than to proprietary platforms.
- Thirdly, using open source would enable India to encourage our own software professionals to provide software support in the form of add-on applications that could be written at a cost much smaller than that required to buy multi-featured packaged software.

Source : http://dqindia.ciol.com/content/top_stories/103101501.asp

Retrieved on 12th July 2010

Simply put.....

- Cost savings
- Security
- Reliability
- Open standards, avoidance of vendor lock-in
- Reduced reliance on imports
- Developing local software industry
- Localization

Weighing Benefits

Benefits of FOSS: Cost Savings

- Zero licensing costs
- Easier administration, especially with thin-client model
- Less downtime from security patching

<http://www.apdip.net>

Retrieved on 12th July 2010

Benefits of FOSS: Cost Savings

- Internet Payment Gateway (IPG) has been developed using LAMP (Linux, Apache, MySQL, PHP) for Guwahati Municipal Corporation (www.myguwahati.in) for payment of online property taxes by the citizens.
- It provides a common gateway to all Nationalized Banks in India through Net Banking, Credit cards and ITZ cash cards
- The IPG has also been implemented for the e-Tendering System and International Payments are accepted online.
- Investment: Rs. 0.1 million only

Where to Expect Costs

- No cost for software – staff time only for evaluation, deployment, and maintenance
- Internal implementation – staff time and IT support
- Outside implementation support – costs for installation, configuration, data transfer, and training
- Internal maintenance – fulltime system admin, hardware procurement and maintenance, IT helpdesk, and network support
- Outside maintenance support – annual helpdesk maintenance, release upgrades, hosting services
- Internal development – programming staff time and IT
- Outside development support – feature enhancement, feature creation, bug fixes

Weighing Benefits contd..

Benefits of FOSS: Security

- Open Source code allows frequent and detailed audits for software holes
- Availability of source code allows user fixing of flaws, instead of dependence on vendor
- Security built into systems by default

Weighing Benefits contd..

Benefits of FOSS: Reliability and Stability

- FOSS systems based on Unix, frequently used as servers.
- Uptime is critical

Benefits of FOSS: Open Standards

- Open Standards - critical in ensuring vendor independence and permanence of stored public data.
- FOSS systems typically use established, open standards:
 - Apache - HTTP, SSL, CGI
 - Mozilla - HTML, CSS, XHTML, POP, SMTP, IMAP
 - Linux Kernel - POSIX
- FOSS products are easily reverse-engineered to determine formats used.

Weighing Benefits contd..

Benefits of FOSS: Reduced Imports

- No licensing fees to foreign companies
- Service-based business model, as opposed to product-based, results in most expenditures staying within local economy

Weighing Benefits contd..

Benefits of FOSS: Development of Local Software Industry

Extensive FOSS developer base normally correlates with an innovative software industry because of:

- Low barriers to entry
- Availability of source code enables easier understanding and experimentation with computer science concepts
- Researchers able to tap into online resources and global development network

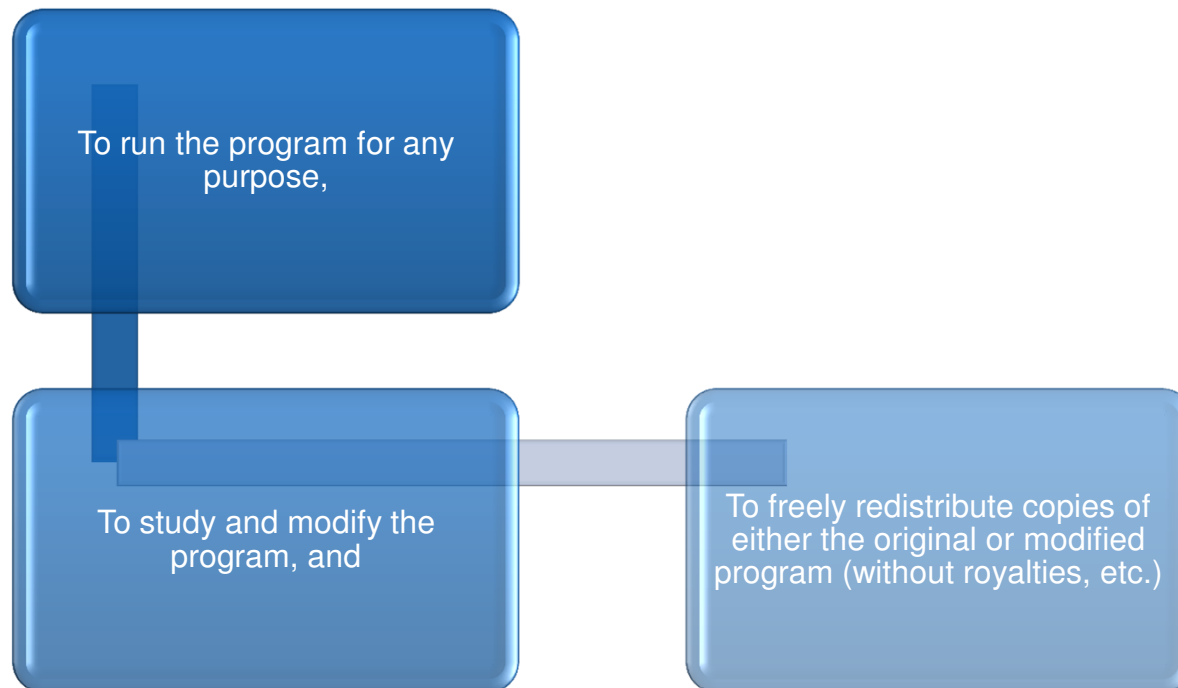
Weighing Benefits contd..

Benefits of FOSS: Localization

- Proprietary software makers localize their software only when economically advantageous
- Easy customization of FOSS systems allows localization to local languages, customs and ways of working.
- FOSS developers are global and multilingual, thus most software is built with internationalization and localization in mind.

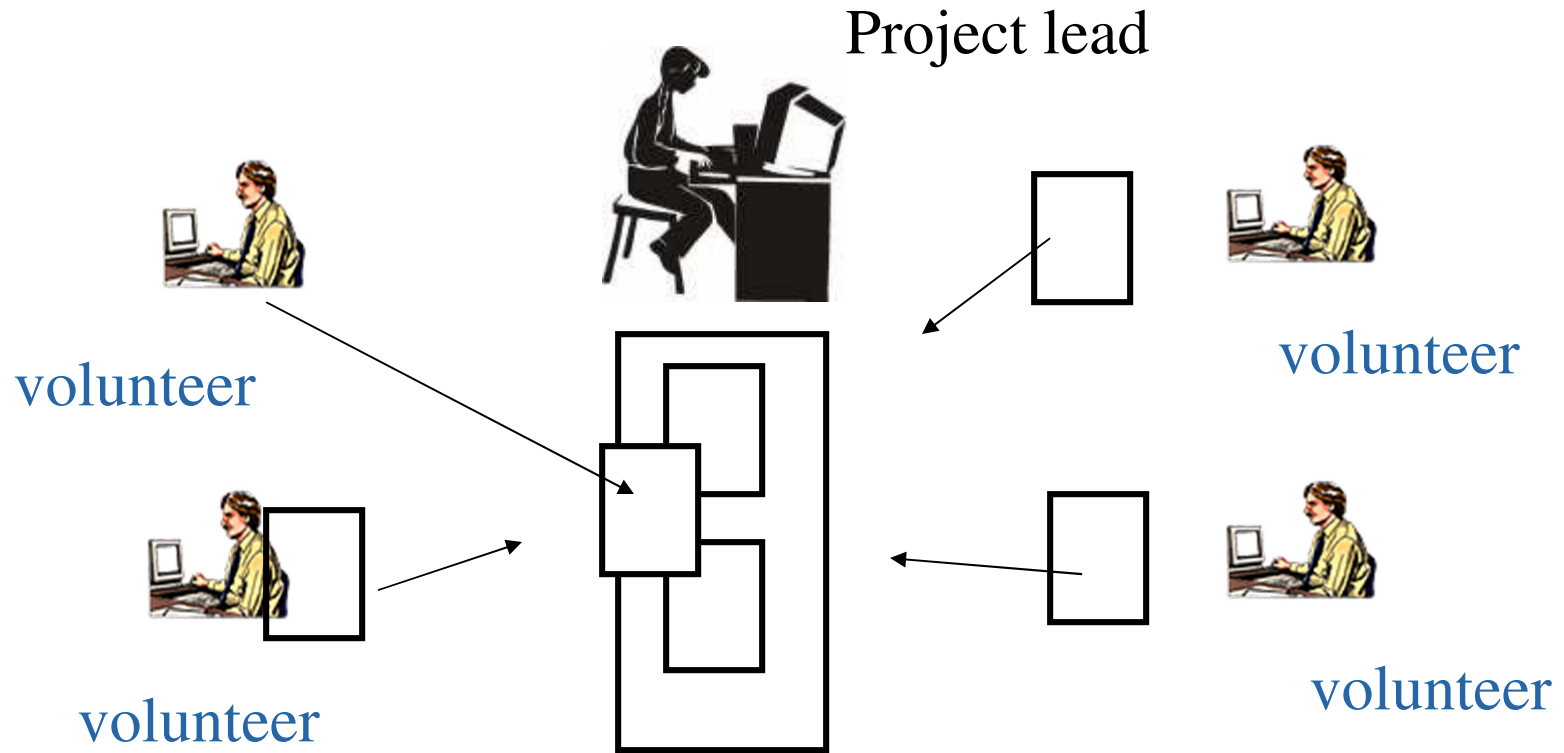
Understanding Open Source Software (OSS)

In simplest of language an OSS is a software licensed to users with these freedoms:



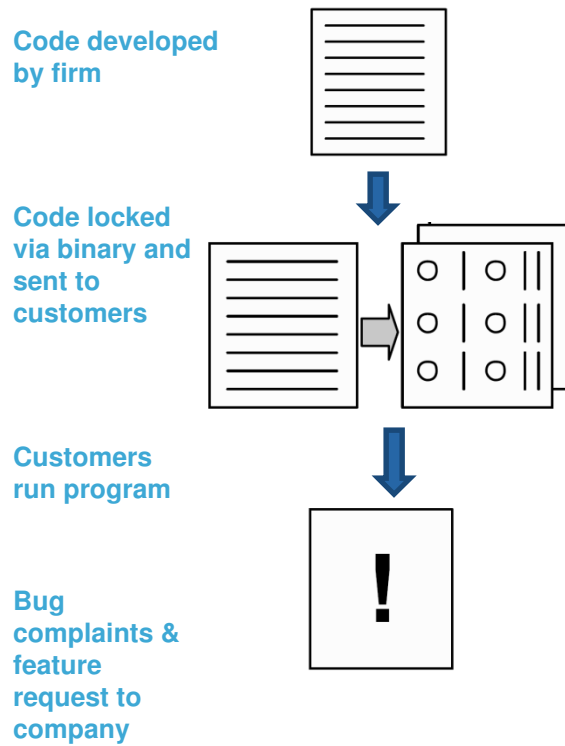
Understanding Open Source Software (OSS)

Open Source is a development model

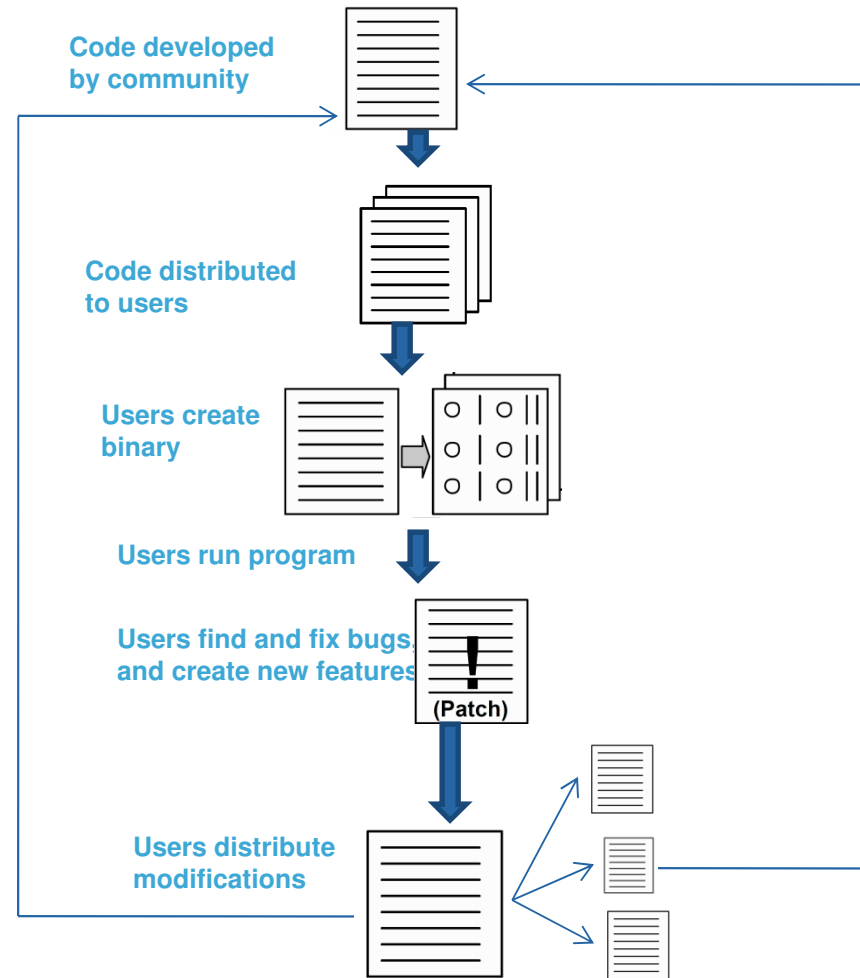


Understanding Open Source Software (OSS)

Firm based software development



Open Source software development



Understanding Open Source Software (OSS).. contd..

- Open Source Software is a software for which the source code is distributed along with the executable program, and which includes a license allowing anyone to modify and redistribute the software.
- Source code is the actual instructions which programmers write to create a piece of software, the "recipe" for the program.
- Once a program has been "compiled" into a form which can be installed and run on a computer, its source code is irretrievable.

Understanding Open Source Software (OSS).. contd..

- It is practically impossible to make changes to a program without having a copy of its source code.
- If a program's license includes the right to modify the program, this right is meaningless unless the source code is readily available.

Understanding Open Source Software (OSS).. .contd..

Open Source Software is

- Software licensed with a copyright license compliant with the Open Source Definition (OSD)
- Software is distributed with its source code in a human readable format
- Software is developed in an open and collaborative way by groups of developers

In practical terms?

Open source means

- The source code is available to the end-user
- The source code can be modified by the end-user
- The licensing conditions promote re-use and wide availability of the software
- The cost of acquisition to the end-user is often minimal

Open Source vs. Free Software

- The Free Software movement and the Open Source movement are separate but have overlapping goals
- Open Source: software should be open source as a matter of practicality (i.e. a development methodology)
- Free Software: software should be free as a matter of social responsibility (i.e. software for the greater good; free as in freedom)

Open Source Definition- As per Open Source initiative

The **Open Source Definition** is used by the Open Source Initiative to determine whether or not a software license can be considered open source.

Some of these criteria are :

a) Free Redistribution

- The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources.
- The license shall not require a royalty or other fee for such sale.

Open Source Definition- As per Open Source initiative

..contd..

b) Source Code

The program must include source code, and must allow distribution in source code as well as compiled form.

c) Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software

d) Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties

Open Source Definition- As per Open Source initiative ..contd..

e) License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program's being part of a particular software distribution.

f) License Must Not Restrict Other Software

- The license must not place restrictions on other software that is distributed along with the licensed software.
- For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

g) License Must Be Technology-Neutral

No provision of the license may be predicated on any individual technology or style of interface.

Open Source Initiative,
<http://opensource.org/docs/osd>

Open Standards

- An open standard is a standard that is publicly available and has various rights to use associated with it, and may also have various properties of how it was designed (e.g. open process).
- The terms "open" and "standard" have a wide range of meanings associated with their usage.
- The term "open" is usually restricted to royalty-free technologies while the term "standard" is sometimes restricted to technologies approved by formalized committees that are open to participation by all interested parties and operate on a consensus basis.

Open Standards contd..

- The term "open standard" is sometimes coupled with "open source" with the idea that a standard is not truly open if it does not have a complete free/open source reference implementation available.
- Open standards which specify formats are sometimes referred to as open formats.
- "Open Standards" facilitate interoperability and data exchange among different products or services and are intended for widespread adoption.

Open Standards contd..

Open Source Initiative's Definition:

- The Open Source Initiative defines the requirements and criteria for open standards as follows:
 - An "open standard" must not prohibit conforming implementations in open source software.
 - To comply with the Open Standards Requirement, an "open standard" must satisfy the following criteria.
 - If an "open standard" does not meet these criteria, it will be discriminating against open source developers.

Open Standards contd..

Other elements of "Open Standards" include, but are not limited to:

- **Collaborative process** – voluntary and market driven development (or approval) following a transparent consensus driven process that is reasonably open to all interested parties.
- **Reasonably balanced** – ensures that the process is not dominated by any one interest group.
- **Due process** - includes consideration of and response to comments by interested parties.
- **Intellectual property rights (IPRs)** – IPRs essential to implement the standard to be licensed to all applicants on a worldwide, non-discriminatory basis, either (1) for free and under other reasonable terms and conditions or (2) on reasonable terms and conditions (which may include monetary compensation).
- **Quality and level of detail** – sufficient to permit the development of a variety of competing implementations of interoperable products or services.

Open Standards contd..

- **Publicly available** – easily available for implementation and use, at a reasonable price. Publication of the text of a standard by others is permitted only with the prior approval of the SDO.
- **On-going support** – maintained and supported over a long period of time.

Open Source Software vs. Proprietary software

- A proprietary license prohibits modification, copying, or redistribution without the company's permission.
- It ensures that only one entity -- the company or individual that created the software -- has the right to make changes or even see the software's internal structure.
- Proprietary software is created by a relatively small group of developers within a particular company
- They complete a program and then try to remove as many flaws (software errors or "bugs," and security "holes") as possible before the software goes to market.

Open Source Software vs. Proprietary software contd..

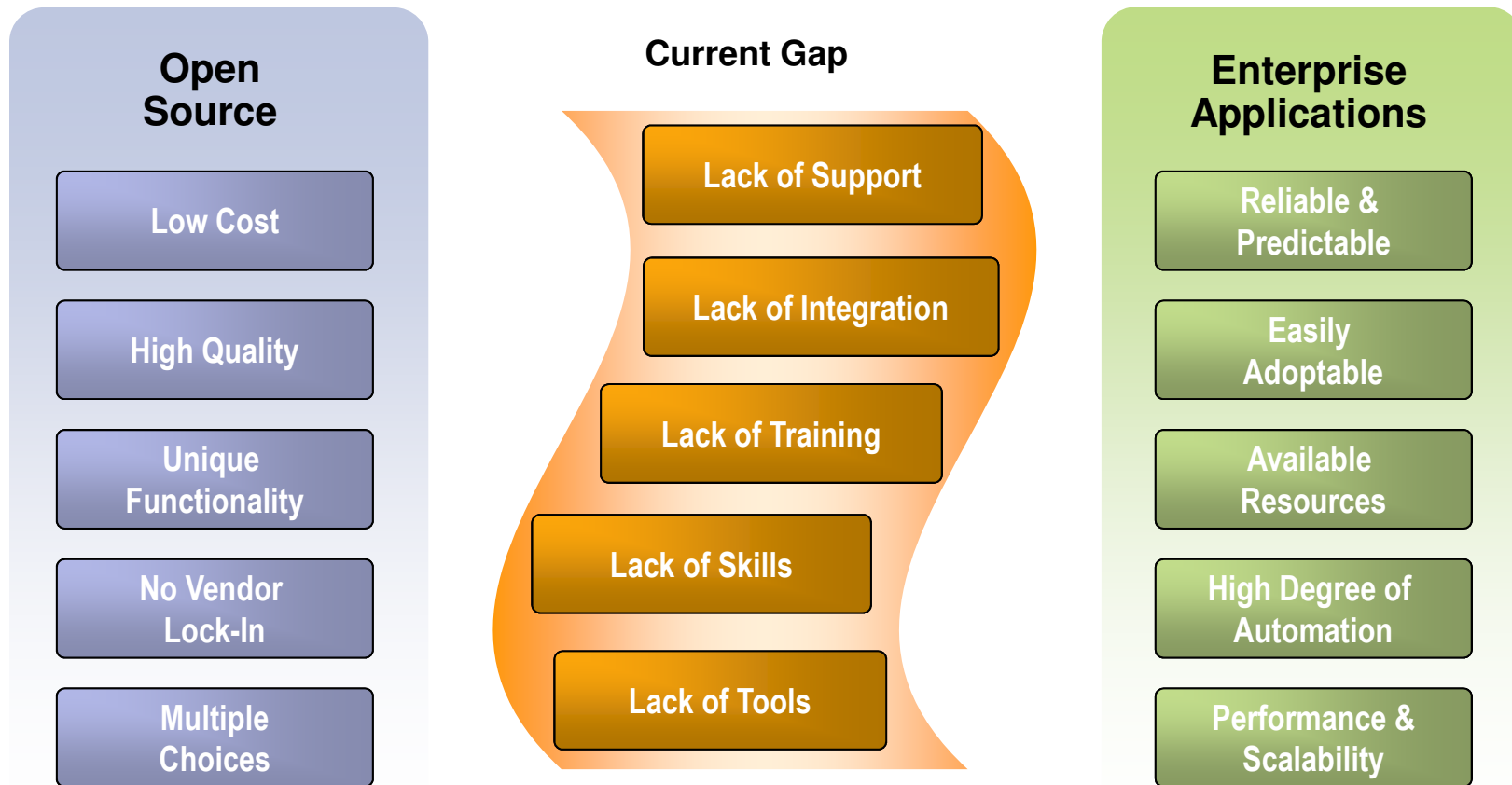
- Any flaws which remain after shipping time become the consumers problem, leading to lost work and frustration.
- Purchasers of proprietary software become involuntary testers.
- Even if users know how to solve a flaw, the software license prohibits them from making the fix themselves.

Comparing GOTS, COTS Proprietary, and COTS OSS

Support Strategy	Flexibility	Cost	Risks
Government-owned / GOTS	High	High	Become obsolescent (government bears all costs & can't afford them)
COTS – Proprietary	Low	Medium*	Abandonment, & high cost if monopoly
COTS – OSS	High	Low*	As costly as GOTS if fail to build development community

OSS is not always the right answer...
but it's clear why it's worth considering
(both reusing OSS and creating new/modified OSS)

Comparing Open Source software and Enterprise application



Myths about Open Source Software (OSS)

- Myth: OSS same as open systems/standards
- Myth: OSS is non-commercial
- Myth: OSS is unreliable
- Open Source Software Is Too Risky for IT Security
- Myth: OSS unsupported
- Myth: OSS is no cost

Myth 1 : Open systems/open standards: Different, yet compatible

- Open System = “A system that employs modular design, uses widely supported and consensus based standards for its key interfaces, and has been subjected to successful tests to ensure the openness of its key interfaces”.
 - Open systems require open standards
- Greater interoperability & flexibility, lower costs, higher security, ...
- Open systems/open standards & open source software:
 - Work well together; both strategies for reducing dependency
 - Not the same thing

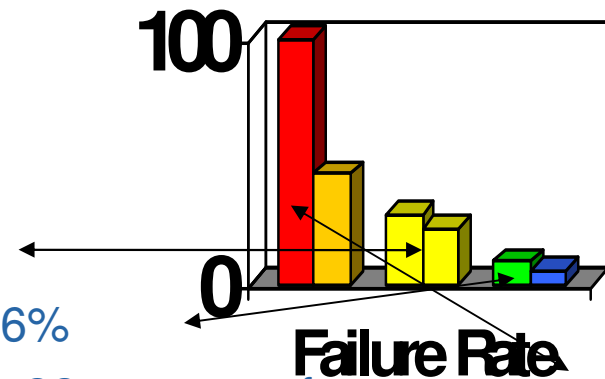
Myth 2 : Nearly all OSS are commercial items / COTS

Nearly all OSS are commercial items

- Many OSS projects supported by commercial companies
 - IBM, Sun, Red Hat (solely OSS, market cap \$4.3B), Novell, Microsoft (WiX, IronPython, SFU, Codeplex site)
- Big money in OSS companies
 - Citrix bought XenSource (\$500 million), Sun buying MySQL (\$1 billion), Red Hat bought JBoss (\$350 million), ...
 - IBM reports invested \$1B in 2001, made it back in 2002
 - Venture capital invested \$1.44B in OSS 2001-2006 [InfoWorld]

Myth 3: OSS often very reliable

- Studies have found OSS apps significantly more reliable [U Wisconsin]
 - Proprietary Unix failure rate: 28%,23%
 - OSS: Slackware Linux 9%, GNU utilities 6%
 - Windows: 100%; 45% if forbid certain Win32 message formats
- IIS web servers >2x downtime of Apache [Syscontrol AG]
- Linux kernel TCP/IP had smaller defect density



[See http://www.dwheeler.com/oss_fs_why.html]

Myth 4 : Open Source Software Is Too Risky for IT Security

- *Network World magazine article states* , “Most of the packaged security appliances for everything from firewalls to security information management are built on the same BSD Unix and Linux distributions as the application servers you build yourself.”
- A recent *Forrester Research report* further argued that enterprises should seriously consider open source options for mission-critical infrastructure.
- Open-Source platforms are as a result considered more secure than many of their proprietary counterparts, since the frequency of the updates offered keeps the windows of vulnerability and susceptibility to an absolute minimum.

Few other myths.....

- Myth: OSS unsupported
 - Businesses support OSS. Red Hat, Novell, HP, Sun, IBM, DMSolutions, SourceLabs, OpenLogic, Carahsoft, ...
 - Community support often good; 1997 InfoWorld “Best Technical Support” award won by Linux User Community
- Myth: Only programmers care about software licenses
- Myth: OSS is no cost
 - Training, support, transition, etc. are not free-of-cost
 - Competition often produces lower TCO & higher ROI for OSS

OSS Strengths

- **Ability to fit local needs:** Availability of the source code means that you can modify and enhance the software to more closely fit your own needs.
- **No restrictions on use:** no restrictions on how the software is used and no invoices for each user license.
- **Low cost:** no charge for the software itself. If other libraries share their efforts, each user's cost is reduced. Pay only for needed support or any additional products & services if required. Even then huge savings than commercial SW.
- **Innovation:** with open source code , users keep-up innovating, improving which means often much faster development cycle when compared to proprietary software

OSS Strengths

- **User-driven:** Traditional vendors focus on providing functionality meeting needs of the majority of their customers. In contrast, OSS features emerge from the community of users. This makes OSS development user-driven: you decide what features are important and deserve attention rather than a vendor.
- **Collaboration:** vibrant local, national and global user groups collaborate in creativity, development and trouble shooting.
- **Reliability:** OSS is peer-reviewed software, exposed to extreme scrutiny, with problems being found and fixed instead of being kept secret until the wrong person discovers.
 - So the code base is more reliable than closed, proprietary software. Mature open-source code is as bulletproof as software ever gets.

OSS Strengths

- **Security:** Proprietary software, with 'closed' source code, support and future development rely solely on the resources of a single vendor. If the vendor goes down, so does your product support.
- Dramatically reduces the potential of supplier lock—in which solves "a huge problem of potential opportunism" and reduces the chances of ending up in "a dependent relationship."

OSS: Weaknesses

- **Unanticipated Efforts:** An Organization may find that it needs to do a great deal more work than anticipated to adapt the software exactly to the local needs.
- **Lack of Coordination:** The decentralized development of open source software means that progress can be chaotic and there may be delays in addressing bugs.
- **Inadequate Technical Support:** Documentation tends to be limited and aimed at developers. There usually is limited technical support, especially for users of the software.
- **Risk of discontinuation:** Development or support may discontinue. The same risk exists with commercial options.
- **Pay-for-Support** provides solution to most of the problems

OSS: Weaknesses contd..

- Long learning curve is a drawback in open source.
- Due to the nature of free and open source software deployment, there is a dearth of open source experts in case of troubleshooting.
- There is no clear ownership for free and open source software. As it's a “global public good” responsibility lies in the cyberspace.

OSS: Weaknesses.. contd..

Pay-for-Support companies and service providers of OSS are using all state-of-the-art technologies and processes to keep OSS products competitive against their commercial competitors.

Some of the open source initiatives in India

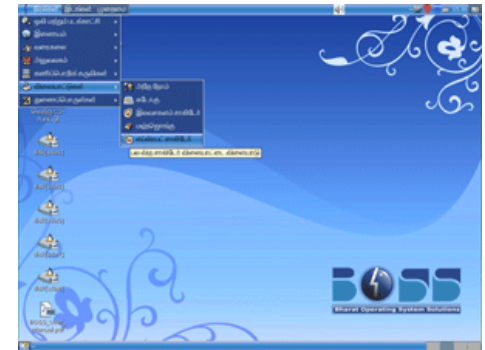
National Research Centre for free/Open Source Software (NRCFOSS)

- National Resource Centre for Free/Open Source Software (NRCFOSS) aims
 - to contribute to the growth of FOSS in India through Research and Development, Human Resource Development, Networking and Entrepreneurship Development,
 - Serve as the reference point for all FOSS related activities in the country including the creation and maintenance of this national FOSS Portal.

NRCFOSS is funded by the

- Department of Information Technology (DIT), Ministry of Communication and Information Technology (MCIT), Govt. of India, and
- Managed jointly by the Chennai division of the Centre for Development of Advanced Computing(C-DAC) and AU-KBC Research Centre, Anna University,Chennai.

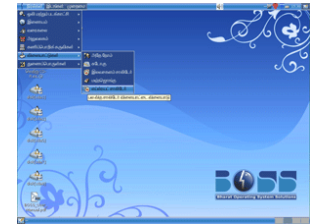
Bharat Operating System Solutions - BOSS



- BOSS (Bharat Operating System Solutions) GNU/Linux distribution developed by C-DAC (Centre for Development of Advanced Computing) derived from Debian for enhancing the use of Free/ Open Source Software throughout India.
- BOSSGNU/Linux - a key deliverable of NRCFOSS has upgraded from Entry level server to advanced server.
- It supports Intel and AMD x86/x86-64 architecture. BOSS GNU/Linux advanced server has unique features such as Web server, proxy server, Database server, Mail server, Network server, File and Print server, SMS server, LDAP server.
- BOSS GNU/Linux advanced server is comprised with administration tool such as webmin which is a web based interface, Gadmin, PHP myadmin, PHP LDAP admin, PG admin.

<http://bosslinux.in/>

Bharat Operating System Solutions - BOSS contd..



- Currently BOSS GNU/Linux Desktop is available in almost all the Indian Languages such as Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Tamil, Telugu, Bodo, Urdu, Kashmiri, Maithili, Konkani, Manipuri which will enable the mainly non-English literate users in the country to be exposed to ICT and to use the computer more effectively.
- The accessibility of BOSS Linux will have a constructive impact on the digital divide in India as more people can now have access to software in their local language to use the Internet and other information and communications technology (ICT) facilities.
- Community Information centers (CIC's) and internet cafes will also benefit from BOSS GNU/Linux as this software can be utilized to power these outlets and is affordable and easy to install, use and support.

FOSS in State Government

Assam Government includes FOSS in state IT policy

- It also extends beyond software and says that all generic hardware purchased by the Government should have support for open source software.
- Entrepreneurs/ companies using FOSS for application/website development would be given preference over those using third party packaged applications.

<http://osindia.blogspot.com/2009/12/yet-another-indian-state-Government.html>

Retrieved on 12th July 2010

IT@Schools

The South Indian state of Kerala, pioneered open source in schools with its famous IT@Schools project, that now covers three million students from the 5th-10 standards, involves 200,000 teachers across 4071 schools.

- Since then, other Indian states like Karnataka, Gujarat, Assam, West Bengal and others have made open source a key part of their school education initiatives.
- a study by the Indian Institute of Management, Bangalore, found that the Kerala Government's usage of OSS saved it Rs 49 crore (\$10.2 million).

<http://opensource.com/Government/10/4/oss-one-best-tools-modernizing-india-education-system>

Retrieved on 12th July 2010

Identifying and Controlling Weeds - OSCAR, India

- The Open Source Simple Computer for Agriculture in Rural Areas (OSCAR) project involves the prototyping of an application software for weed identification and control of the rice and wheat crop systems of the Indo-Gangetic Plains.
- It is targeted at being deployed on low-cost computing devices running GNU/Linux that can be shared among farmers of a local community.
- OSCAR is unique in that it is the first of its kind within the domain of information and communications technology (ICT) applications for agriculture.
- By being available as FOSS, it promotes the aggregation of information from academic/research institutions as well as from traditional knowledge systems.

Identifying and Controlling Weeds - OSCAR, India.... contd..

- The OSCAR project aims to address the issue of declining agricultural productivity in South Asia by producing a tool for decision-making in weed identification and control.
- The specific objective of the project is to demonstrate a prototype of this tool implemented in software and running on desktop computers and low-cost computing devices.
- The project has tested the application with various target groups in the four countries of the IGP – Bangladesh, India, Nepal and Pakistan, with encouraging results.

eBiz

- The Government of India has started its eBiz initiative - a project to build a framework for Government to Business (G2B) services where services from the federal, state and local Government agencies will be made available through a single portal.
- The eBiz architecture is to be built on the principles of interoperability and open standard

Few other worldwide examples

Dspace

- DSpace captures data in any format – in text, video, audio, and data. It distributes it over the web. It indexes the contents, so users can search and retrieve items. It also preserves digital work over the long term.
- DSpace provides a way to manage research materials and publications in a professionally maintained repository to give them greater visibility and accessibility over time.
- DSpace is freely available as open source software.

Few other worldwide examples

Eprint

- EPrints Open Source Software is a platform for building repositories of research literature, scientific data, student theses, project reports, multimedia artefacts, teaching materials, scholarly collections, digitised records, exhibitions and performances.
- It has features such as
 - * Archive Documents, Multimedia and Data
 - * Multi-Language Support

Few other worldwide examples

Drupal

Drupal is a free software package that allows an individual or a community of users to easily publish, manage and organize a wide variety of content on a website.

It enables features such as:

- * Content Management Systems
- * File uploads and downloads, etc

Joomla

Joomla! is an Open Source Content Management System.

It is used for creating simple websites to complex corporate applications.

Wikipedia

Wikipedia has become the world's largest encyclopedia due to adoption of an open source model.

<http://www.dwheeler.com/numbers>

<http://eGovstandards.Gov.in>