

OPEN SOURCE SOFTWARE-A STUDY ON CHOICE OF LINUX BY SMB'S

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Abstract— In Spite of increasing interest and open source software growth, this article discusses about Linux-the open source software in Business. This study reveals the factors that influences on the selection of LINUX. This study is a qualitative research, which turns back the pages of past studies about LINUX and the factors that lead to select LINUX as Operating System. The results revealed that most of the SMB's prefer LINUX-OSS for Open Source, Freeware, low implementation cost, Security, Firewalls (less vulnerable to computer malware), Interoperability, Reliability, Support, Management Application, File Sharing, Databases, E-mails, DNS/File Servers.

Index Terms— Freeware, LINUX, Open Source, Small and Medium Sized Business

I. INTRODUCTION

THIS Paper discusses about Open Source Software-Linux in Business. Open Source Software is an emerging type of software that fundamentally affect the business and economic features of the software industry. Linux, an open source operating system is the prominent example of the potential of the open source movement, which is being competing against Microsoft Windows.

The operating system is free to use and everyone has the freedom to contribute to its development. This co-operative development model means that everyone can benefit. Because of this, we like to call it Free Software, or Socially Responsible Software. Together, Free and Open Source Software is collectively abbreviated as **FOSS**. This contrasts with the proprietary (or *closed source*) development model used by some software companies today. Closely related is the concept of Open Source Software. Many of the principles behind FOSS are derived from the axiom of standing on the shoulders of giants, most famously used by Isaac Newton, which has guided scientific and industrial development for hundreds of years. Transparency of the code and development process means that it can be participated in and audited at all levels. Software is just another form of information, and people have the right to have full control over that information. In the same way that you are free to share cooking recipes with your neighbor, you should also have the freedom to share and change software. Due to its ubiquity, it is almost certain that you already deal with FOSS, at least indirectly. For instance, any

time that you use Google, Yahoo, YouTube or Facebook — or most Web sites for that matter — you are communicating with computers running FOSS. Wikipedia is an example of a Web site that is not only hosted on FOSS, but is actively developed in the same open and collaborative spirit as FOSS. The world of film making is no stranger to FOSS. FOSS has played a vital role in the productions of blockbuster films like Titanic, The Lord of the Rings trilogy and Finding Nemo. The short films, Elephants Dream and Big Buck Bunny, were built entirely by community members using FOSS methods and software — the same software that that you can download for free and run on your home computer. The films as well as its sources are openly available under a Creative Commons license. Many groups in the government, business and education sectors use Linux as a means of cutting costs. It also allows them to create products that they would not otherwise be able to make. Small business makes the bulk of our economy, and FOSS enables them to compete on a world stage by allowing them to draw from a wealth of free software to build their products and services. As their improvements are fed back into the commons, everyone benefits¹.

This study focusses on choice of LINUX by SMB's on Business Perspective. And also to identify the factors, why SMB's prefer open source operating system, while proprietary operating system is available.

II. ABOUT OPEN SOURCE

Open source, by definition, means that the source code is available. Open source software (OSS) is software with its source code available that may be used, copied, and distributed with or without modifications, and that may be offered either with or without a fee. If the end-user makes any alterations to the software, he can either choose to keep those changes private or return them to the community so that they can potentially be added to future releases. An open source license is certified by the Open Source Initiative (OSI), an unincorporated nonprofit research and educational association with the mission to own and defend the open source trademark and advance the cause of OSS. The open source community consists of individuals or groups of individuals who contribute to a particular open source product or technology. The open source process refers to the approach for developing and maintaining open source products and technologies, including software, computers, devices, technical formats, and computer languages.

III. OVERVIEW OF LINUX

Linux is a Unix-like computer Operating System (or OS) that uses the Linux kernel. Linux started out as a personal computer system used by individuals, and has since gained

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the support of several large corporations, such as Sun Microsystems, HP and IBM. It is now used mostly as a server operating system, with some large organizations using an enterprise version for desktops. Linux is a prime example of open-source development, which means that the source code is available freely for anyone to use. Linus Torvalds, who was then a student at the University of Helsinki in Finland, developed Linux in 1991. He released it for free on the Internet. Due to the far reach of the Free Software Foundation (FSF) and the GNU Project, Linux popularity increased rapidly, with utilities developed and released for free online. A commercial version of UNIX was released by RedHat in the early 1990's (combining the OS with technical support and documentation) and the popularity of Linux continued to skyrocket².

By the beginning of the 90s home PCs were finally powerful enough to run a full blown UNIX. Linus Torvalds, a young man studying computer science at the University of Helsinki, thought it would be a good idea to have some sort of freely available academic version of UNIX, and promptly started to code. Two years after Linus' post, there were 12000 Linux users. The project, popular with hobbyists, grew steadily, all the while staying within the bounds of the POSIX standard. All the features of UNIX were added over the next couple of years, resulting in the mature operating system Linux has become today. Linux is a full UNIX clone, fit for use on workstations as well as on middle-range and high-end servers³.

Linux is, in simplest terms, an operating system. It is the software on a computer that enables applications and the computer operator to access the devices on the computer to perform desired functions. As an open operating system, Linux is developed collaboratively, meaning no one company is solely responsible for its development or ongoing support. Companies participating in the Linux economy share research and development costs with their partners and competitors⁴.

Linux has many other benefits, including speed, security and stability. It is renowned for its ability to run well on more modest hardware. Linux comes from the venerable UNIX family of operating systems, and so has been built from the ground-up with Internet-style networking and security in mind. Hence, viruses, worms, spyware and adware are basically a non-issue on Linux⁵.

TABLE-1

Salient Features, Pros & Cons of Linux

Features of Linux	Advantages	Disadvantages
Linux is Technically advanced	Stability	Learning Curve
Linux is highly customizable	Open-Source	Equivalent Programs
Linux is secure	Free Software	More technical ability needed
Linux Community	Low Implementation Cost	Not all hardware compatible
Software dependencies	Runs on Old hardware	Higher Costs for Maintenance
Multi-Tasking	Security	Extended Development Time
Multi-User	Fast & Easy to Install	Customization Costs
Multi-Platform	Less vulnerable to computer malware	

Multi-Processor	Performance	
	Network Friendliness	
	Flexibility	
	Compatibility	
	Choice	
	Multi-Tasking	
	Full use of hard disk	

Table 1 portrays the salient features, pros and cons of linux. Even though there are lots of positive factors to deploy linux in business, we have to look into some disadvantages too for efficiency.

IV. SOME OF LINUX VENDORS

Debian, Caldera, Corel, RedHat, SUSE, Turbo Linux, Blue CAT, Lineo, etc. are the some of the linux vendors.

V. WHY LINUX IS A CHOICE OF SMB'S

Linux the Open-Source-Code operating system that can be downloaded free over the Internet is catching fire of small-business market for a host of reasons according to some resellers. "The operating system is supported by a large number of low-cost or free applications", for what small businesses want to do, said David Sifry, Chief Technical Officer at Linux Care, a San Francisco based Linux-Support Organization. Linux is a multi-user, multi-tasking operating system that can be used on a UNIX work station or server. It also runs on PC equipment, Compaq alphas, Sun SPARC stations & Apple Macintoshes. Many of Linux care's small-business clients use Linux for file sharing & Email, Sifry said. Linux is a great deal for small business & for resellers said Jay Ferron, President of Connecticut online web services inc., New Haven. "For less than \$100, a small business can buy software that will give it web access, FTP & E-Mail, Ferron said. "In general small as well as larger companies choose LINUX because they are attracted by the price" Sifry said. "But in the end they are won by the reliability, flexibility & scalability of the operating system. Linux is a perfect fit for small business owners because they spend virtually nothing on the operating system or applications & can therefore better afford to spend money on IT support, which they typically lack internally⁶.

VI. REVIEW OF LITERATURE

Many studies from literature reveals that open-source software community has been developed. Linux users form as LUG's for Interaction and Motivation to contribute on OSS Projects. "A Brief History of Hackerdom", [1] observed that since its very beginnings, the hacker culture, which later gives birth to the OSS movement has been shaped by a strong sense of community & significant influences of the group on Individual hackers. The characteristics of early hacker culture that Raymond described epitomize the very three elements that sociologists [2-4] have long viewed to be the fundamental markers of community that also permeate present-day OSS development & user groups. Recent studies by [5-6], seem to suggest that the OSS community plays a silent role in motivating developers to contribute OSS projects. [7] have given good understanding of why developers contribute software code to

OSS projects. Linux has grown to be the best known, most successful, and widely adopted of all OSS to date. [8] stated in his study, at the end of 2003, the total users of Linux worldwide were estimated to be 18 million, 45% of all mid-sized U.S. businesses has adopted were experimenting with Linux, its server market share had grown to 28.3% and it was projected to be the fastest growing desktop operating system through 2007. [9] stated that success factor of Linux is, it is large and actively engaged community of users. Linux has decentralized models of development, distribution & support with extensive grassroots user involvement [10-11]. [12-16] research finds that Linux, like other operating systems, has experienced a reduction in growth of software spending. Not surprisingly every operating system platform sees a significant reduction in growth during 2009, but the recovery has started in 2010. In 2008, Linux software market generated \$12.3 billion in spending & that total is projected to nearly triple to \$35.5 billion in 2013. Also IDC in their survey found that 53% of respondents are planning to increase adoption of Linux on the server & 48% are planning to Increase adoption of Linux on the client as a direct result of the economic climate. From a regional perspective, Asia/Pacific is the most bullish on increasing Linux adoption as 73% of respondents said they would increase adoption of Linux deployments on the server and 70% said they would increase adoption of Linux on the client. In America, 66% said they are evaluating or have already decided to increase adoption of Linux on the desktop & 67% on the server. The end-users projections are optimistic, since Linux is a key part of IT deployments moving forward⁷. IDC's Kusnetzky noted Linux appeals to small business owners because it can run on older hardware & smaller systems with less memory, and that the software can be downloaded from the Internet free or purchased for a very reasonable price. "uniweld's smith, estimates his company has saved more than \$30,000 in licensing & support, as well as applications packages & hardware it did not have to buy. One of the strongest lures of open source software for growing businesses is the freedom from the expense & irritation of Proprietary licenses that require a fee for each user or each connection. "An Owner of 15 retail stores, for.eg. can buy one Linux Package & make 14 copies without violating any license agreements" Kusnetzky said. "Julio Rodriguez, office manager for atlas Roofing in Tamarac, agreed that the freedom from Microsoft Licensing restrictions and software audits is one of Linux's big benefits. Also added "I don't need to worry about what is legal software in the Office" and adding another reason, he went with Linux is virus free. "Haim Dimer, a local linux Consultant & speaker at Linux gatherings, "If you can use a mouse and a Keyboard you can use Linux"⁸.

[17] Conducted survey about LUGS and Social Influence on user participation. [18] argued with evidences in a survey that OSS have Bright future. [36] Linux evolution has been studied by several authors. Several authors have studied Linux growth, This is also related to the potential increase in complexity, and the ensuing consequences regarding maintainability. [37] The choice of Linux is not accidental.

⁷www.idc.com ,white paper "The opportunity for Linux in a new economy, sponsored by linux foundation, Al Gillen, April 2009

⁸ Tribune Business News [Washington] 14 July 2003:1 winter, Christine, knight rider

Linux is perhaps the best known and most successful open-source project in the world, to the point of becoming the poster-child of the whole open source movement. The source code of its full development history is freely available from <http://www.kernel.org> and numerous mirrors worldwide – at present totaling 1322 versions.

VII. OBJECTIVES OF THE STUDY

1. The main and prime objective of the study is to identify the factors that influence the users to select LINUX for their Business.
2. To identify the prime factors, that plays a major role in selection of LINUX by SMB's.

VIII. METHODOLOGY

This study is a descriptive study, which has been done with the support of literature review available from various sources and secondary data like Business News, Newswire, Business Wire, IDC, Company reports and analysis.

IX. SUMMARY

Past studies reveal that certain factors are influencing the users for selection of LINUX for their Business. The factors have been highlighted below:

TABLE-2
Review Support and the factors emphasized on past reviews

Author Reference No.	Factors emphasized in Review of Literature			
[16]	Tremendous Linux adoption/ Technical Computing	Web/Internet Infrastructure/ Enterprise Appln.soft wares/ Embedded Systems	Database/ E-mail	Reliability/ Compatibility/ System Mgmt./ Network Mgmt
[19]	Firewall/ Ongoing Support/Maintenance	Business Efficiency/ Managing Complexity / Staff/Resource Requirements	Interoperability/ Flexibility/ Customizable	Ease of Use/ Free Code/ Initial Cost/ Security/ Stability
[20]	Open Source/ Complementarity Services/ Quality of application	Maximize User Surplus	Large Investment in applications/	Availability of support/ Security (0.17 Security flaws per 1,000 lines of code
[21]	Linux Gains Mind Share, Linux makes a splash	Free Open Source	Zero total cost	Internet Infrastructure(for supporting SAP, SAS, Oracle 9i)
[22]	Open Source/ Availability/ Ease of Use	Interoperability/	Performance/ Security/ Quality	Reliability/ Flexibility

[23]	Freeware	Supports all Functions	Stable/ Value Proposition (Spend nothing on Software and Software maintenance)	Runs on inexpensive hardware
[24]	Free Stuff/Open Source/Firewalls/Security	Support/Stability/Web Servers	Mgmt.appl n./Fin appln./ CRM/ ERP	File/Print Sharing/ DNS/File Server/ Database/E-mail
[25]	Open Source Code/Free ware/ Low total cost	Multi user/ Multi-tasking	Security/ Firewall/ File sharing/ e-mail	Support/ Reliability/ Scalability/ Flexibility
[26]	Open Source/Free access to source code	Server appln. Support	Embedded Systems/ap pln.	No license
[27]	Open source/ Low Cost	Compatible / Reliability	Database/ IT Infrastructure/ Web Infrastructure/ Appln.Development	ERP/ General Business Processing
[28]	Lower acquisition Cost	Support/ Firewalls/ Infrastructure Server appltn.	One-time migration/ transition/ One-time or On-going Integration	Web servers/ Databases/ DNS Servers/ Intranet Proxy Servers

Table-2 shows the factors which are highlighted by the past researchers that, why people deploy Linux for their business? Some factors are repetitively emphasized by several researchers, which receive prime importance.

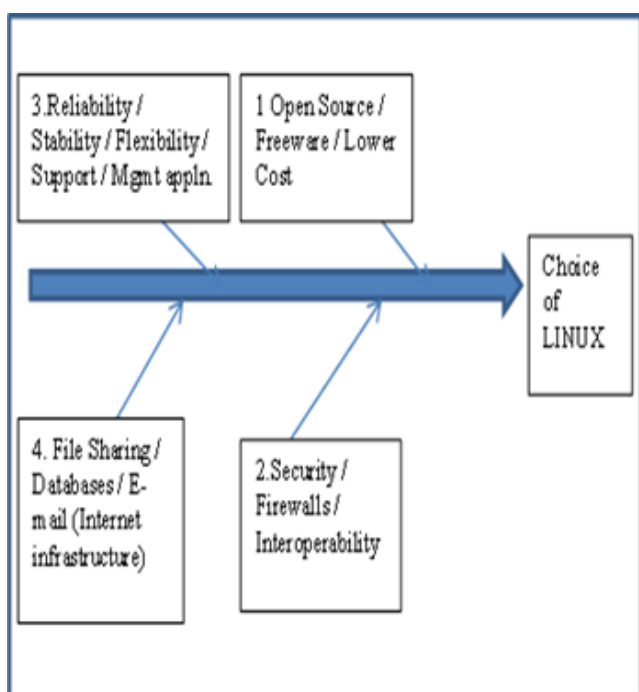


Fig.-1 Factors and Effect-Cause Effect Diagram

It is evident through summary of literature support, that certain factors influence the users to select LINUX- OS for their Business. Fig.No.1. The cause effect diagram is drawn through the support of literature review. The repetitive factors from various studies have been taken as prime factors, which play a major role in adoption/selection of Linux. The factors have been grouped based on repetitiveness and priority.

The above diagram clearly depicts the factors influence the selection of LINUX in Business. The Prime factors are:

1. LINUX is an Open source, where it can be downloaded from internet for free and very lower implementation cost.

2. Next, for security reasons, LINUX is considered as a choice for business. Because, in a stated that stated [20, 28] LINUX has (0.17 Security flaws per 1,000 lines of code), compared to average 10-20 flaws of proprietary software. Also it is less vulnerable from computer malware (Firewalls). It is Interoperability in nature, with other non-Microsoft legacy systems and environments, etc.

3. It is highly reliable and flexible for servers, Desktops and Embedded Applications. It is also stable; every time doesn't need to be rebooted periodically to maintain performance. It supports other functions and Management applications like ERP, CRM, SAP and SAS.

4. Linux has proven itself for single-use appliance server for internet infrastructure. Most firms running LINUX are using it to provide Web/Internet Infrastructure, database, e-mail, file/print sharing, Systems management and Network Management. It is obvious from studies that many websites run on LINUX than any other operating system. LINUX is a popular choice for Internet Infrastructure.

X. OTHER GIANT BUSINESS FIRMS WHO DEPLOYS LINUX FOR THEIR BUSINESS

XI. TABLE-3

Giant Business Firms who deploys linux

GOOGLE	Amazon	Wal-Mart	Motorola
FEDEX	Disney	Dream Works	L.L.Bean
Pixar	Merril Lynch	Smith Barney	Comp.Associatie
Shaw's Super Markets	Tommy Hilfiger	Cendant	Mc.Donalds
Shell	Chevron	Glaxos	Pixar
Warner Brothers	Securities Industry Automation	US Military	Uniweld

Table-3 lists the Giant firms who deploy Linux for their business, which proves the users of Linux in Business are growing tremendously [29-35].

XII. CONCLUSION

This tiny study addresses the factors and prime factors that influence users to select LINUX for their Business. Certain factors were identified with the help of literature support and proven that LINUX is a good choice for implementing Business applications. And point to ponder out here is LINUX is a most preferred choice of small and medium sized Businesses (SMB's) for their Business applications and Success. Big Giants also using LINUX platform for Reliability, Stability, Flexibility, Internet Infrastructure and more supported functions. It is evident that LINUX market has grown well and the market opportunities are wide for LINUX platform. The Open-Source model is a powerful phenomenon in computer industry. Hence the Business Organizations put an emphasis for selection criteria, in order to meet out the ultimate Business goals.

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