# Linux, an Alternative Operating System Choice for Student

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**Abstract:** The objective of the study is to understand the operating system and how the cost licensing of the operating system becoming major issues. Open source operating system can be the alternative to reduce the cost of software licensing for the student and also others. The advancement of the Linux nowadays and it started replacing the user computer with the open source software. License/Commercial operating system software need to purchase for each of the computer and for upgrading to newer version the user required to purchase new license. Software piracy has becoming the trend to avoid purchasing the license/commercial software and these have becoming a plaque to the community.

**Key words:** Linux, Operating System, Open Source, Student, Cost.

## Introduction

Shelly, Vermaat, Quasney, Sebok, & Freund (2012), an operating system is a set of programs that coordinates all the activities among computer hardware devices. It provides a means for users to communicate with the computer and other software. Many of today's computers use Microsoft's Windows. When a user starts a computer, portions of the operating system are copied into memory from the computer's hard disk. These parts of the operating system remain in memory while the computer is on.

According to Linux.org (2012), Linux is an operating system that developed from a kernel made by Linus Torvalds when he was a student at the University of Helsinki. He was using a version of the UNIX operating system called 'Minix', he and other users sent requests for modifications plus enhancements to Minix's creator, Andrew Tanenbaum, but the author felt that the request weren't necessary. That's the reason why Linus decided to develop his own operating system, developed in collaboration with other programmer that contributed the source code that would take into account users' comment and suggestions to improvements the operating system. Then operating system was later were introduced in late 1991 and known as Linux. Linux is an operating system means that it's intended to be used as an alternative to other operating systems for example Microsoft Windows, Mac OS, MS-DOS, Solaris and others operating system. Linux is not a program like a word processor and is not a set of software package like an office suite. Linux is an interface between computer/server hardware, and the programs which run on it.

Kirby (2000), stated that the Linux, the open source operating system originally developed by Linus. No Linux distribution is costly when equated to the price of licensing a commercial operating system. Linux runs on a wide range of hardware. In particular cases, Linux can allow old machine to install after it is no longer supported by the manufacturer. Due to its low resource requirements, Linux often can provide adequate performance on equipment that would be considered underpowered for use with commercial operating systems. Linux users appreciate a varied choice of application software. User interested in using Linux as a server can choose from a huge number of beneficial programs. A moderately underpowered PC running Linux makes a well Web server using Apache. Using SAMBA, a Linux system can function as a file plus print server for Macintosh and Windows clients/pc.

## Linux Kernel

Corbet, Kroah-Hartman, McPherson (2012), the Linux kernel is the lowest level of software running on a Linux system. It is charged with managing the hardware, running user programs, and maintaining the overall security and integrity of the whole system. It is this kernel which, after its initial release by Linus Torvalds in 1991, jump-started the development of Linux as a whole. The Linux kernel keeps growing in size over time as more hardware is supported and new features are added.

The kernel which forms the core of the Linux system is the result of one of the largest cooperative software projects ever attempted. Regular 2 to 3 month releases deliver stable updates to Linux users, each with significant new features, added device support, and improved performance. The rate of change in the kernel is high and increasing, with between 8,000 and 12,000 patches going into each recent kernel release. These releases each contain the work of over 1,000 developers representing nearly 200 corporations. Since 2005, over 7,800 individual developers from almost 800 different companies have contributed to the kernel. The Linux kernel, thus, has become a common resource developed on a massive scale by companies which are fierce competitors in other areas.

## Software Piracy and Open Source Software

Software piracy has seizure into a major problem for the software business. Software piracy violates existing copyright laws. Software developers protected by laws where unauthorized use and dissemination of copies of software without their authorization are illegal. Software piracy was considered to be acceptable and normative behaviour among college students. Major factor causing people to install pirated software because of cost and if given chance people choosing either originals or copies, they probably choose the pirated software because cheap and easy to get, Lau (2006) besides Kirby (2000) supported that cost is the most influence user in using commercial software licensing in their pc. Where by the software can purchase from the shop or just can be downloaded from the internet for free.

Software crack, the application code itself is reverse-engineered in order to recognize and reverse the copy protection methods in place. Copy protection systems for conventional desktop software can be complicated and intense to bypass. Key generator software emulates the software supplier's own user authentication system, allowing the illegal user to generate a serial number in order to register the software, Goode (2010). While the sensitive copy protection for retail versions can underwrite to the prestige associated with pirated software. So as to remove the copy protection, a cracker installs the software and then observers its process to define how it is deterring duplication. Cracked software is then packaged and uploaded to the group's private software servers. While other users then work to share the pirate software to other releases website.

Apart from that, Mutula & Kalaote, (2009) detailed that open source software is progressively seen as a good instrument because of its low cost compared with commercial software. Open source software refers to software that is free of proprietary restrictions and is developed, released and can be modified by the public for free of charge. The users of open source software are able to view the source code because source code given to the user, then alter the code and redistribute it. Installation of open source software is usually available to anyone without high priced license fees or other proprietary limitations. Open source software presents a good chance for the third world countries to move toward the information society by helping bridge the digital divide and deepening universal access. And open source software is not about cost, propaganda or taking business away from vendors rather it signifies the freedom to use the software for any purpose, freedom to study how the software works, freedom to modify the software to adapt it to one's needs, and freedom to copy and share copies of the software, with or without any changes one might make to it, Singh & Sanaman (2012).

This also supported by Free Software Foundation (2013, February 28) where define "Free software" means software that respects users' freedom and community. Roughly, the users have the freedom to run, copy, distribute, study, change and improve the software. With these freedoms, the users (both individually and collectively) control the program and what it does for them. When users don't control the program, the program controls the users. The developer controls the program, and through it controls the users. This nonfree or "proprietary" program is therefore an instrument of unjust power.

A program is free software if the program's users have the four essential freedoms:

- The freedom to run the program, for any purpose (freedom 0).
- The freedom to study how the program works and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbour (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

Supported by Clay, C. (2012, January 31), a significant amount of money could be saved, if the business had switched to open source software when they had the opportunity. Proprietary and non-free products not only require a preliminary acquisition, and then often require re-purchasing upgrades at definite intervals, in order to stay compatible with the current hardware and/or Windows operating system. Open source Software are updated but still remain provided at no price to the community. Also Ziemer & Stenz (2012) believed that open source software is an alternative to commercial software. Successful open source projects have dynamic community that systematizes the group effort of users on the project's support and maintenance. Existing open source projects have proven that a community of users can develop large software systems.

## Methodology

The objective of the study is to identify the students' problem when using commercial/license operating system and their awareness of Linux operating system as alternative. The benefit from the free/low cost of the operating system installed in their computer. The questionnaires were distributed via online using Google Drive Survey Form and totals 65 respondents' which are the second year student from Faculty of Information Management UiTM Sarawak. The survey was done from February 2013 to March 2013 and the respond were gathered and then analyse using PSPP, the open source software for data analysis.

## Results

There are two methods that were used in the survey which are reliability and validity. Reliability is about the consistency of the measurement which is it refers to the consistency. Meanwhile, validity assesses whether the test measures what it claims to measure. In this survey, the instrument was tested for its validity and reliability. This is to ensure that the measures developed in the instrument were reasonably appropriate. The validation and reliability test conducted to ensure the instrument chosen is suitable and accurate. Cronbach's alpha determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability. A reliability coefficient of .70 or higher is considered acceptable in most social science research situations and for this survey .822 for Cronbach's alpha. This disclosed that the items tested can be used for the research.

In Table 1 showing the gender of the respondent of the survey and female respondent were 39 respondents out of 65 of overall respondent.

**Table 1**: Respondent Gender

| Gender | Respondent (65) | Percentage (100%) |
|--------|--------|--------|
| Male | 26 | 40 |
| Female | 39 | 60 |

In Table 2, based on respondent own assessment, about their experience/knowledge of respondent using computer have 3 responses, Beginner, Intermediate and Expert. Majority of the response answered Intermediate as their answer which 53 respondent (81.54%). Intermediate which mean the respondent has basic skills and knows a little bit of technical skill in troubleshooting/fixing/using the computer.

**Table 2**: Experience/Knowledge using computer

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Beginner | 8 | 12.31 |
| Intermediate | 53 | 81.54 |
| Expert | 4 | 6.15 |

Type of computer currently the respondent have or owns, 41 (63.08%) respondent responded that they own Laptop/Netbook only and 20 (30.77%) respondent have Laptop and Personal Computer/Desktop in Table 3.

**Table 3**: Type of computer currently own

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Personal Computer/Desktop (Only) | 4 | 6.15 |
| Laptop/Netbook (Only) | 41 | 63.08 |
| Both | 20 | 30.77 |

**Table 4**: Current operating system used/installed

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Microsoft Window | 58 | 89.23 |
| Mac OS | 1 | 1.54 |
| Linux | 0 | 0 |
| Dual OS (Two or More OS installed in one computer) | 6 | 9.23 |
| Others | 0 | 0 |

Table 5 showing the current operating systems installed in the respondent computer are genuine and preinstalled during purchase. Genuine software mean the software have license not pirated and preinstalled mean the computer comes with the operating system during purchase usually included with recovery partition or cd recovery reinstallation purposes. 34 (52.31%) respondents stated that their operating systems are genuine and 23 (35.38%) respondents stated their operating system not genuine. 29 (44.62%) respondent stated that their operating system came preinstalled during purchase and 28 (43.07%) respondent said the operating system preinstalled and no installation required.

**Table 5**: Current operating system genuine and preinstalled during purchase

| Response (65 Respondent) | Yes | No | Not Sure |
|---|---|---|---|
| Genuine | 34 (52.31%) | 23 (35.38%) | 8 (12.31%) |
| Preinstalled | 28 (43.07%) | 29 (44.62%) | 8 (12.31%) |

In Table 6, there were extra cost of for the respondent to installed the operating system which 29 (44.62%) of the respondent stated that. While 28 (43.07%) respondent stated there were no cost for the operating system during computer purchase.

**Table 6**: Extra cost for the operating system to be installed in the computer

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Yes | 29 | 44.62 |
| No | 28 | 43.07 |
| Not Sure | 8 | 12.31 |

Majority of the respondent stated that not willing to pay for the Microsoft Windows License for future upgrade and when purchasing new computer which 59 (90.77%) of the respondent. While only 5 (7.69%) respondent willing to purchase the operating system license. Among of comment of the respondent that reluctant to purchase the operating system were the cost of the license quite expensive and prefer that amount to be used in other matters. In Microsoft Online Store (http://www.microsoftstore.com/store/msapac) showing the price of Microsoft Windows Pro Upgrade (Student Price) cost RM215.00, Microsoft Store (2013).

**Table 7**: Willing to pay for the operating system (Microsoft Windows) license in future upgrade or purchasing new computer.

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Yes | 5 | 7.69 |
| No | 59 | 90.77 |
| Not Sure | 1 | 1.54 |

As listed in Table 8, there were 63 (96.92%) of the respondent not reluctant to use the pirated software in their computer as coherent with the result in Table 7 which the cost were main of their concern. As stated by Lau (2006) and Kirby (2000), pirated software easily to obtain by just purchase at the cd store or just by downloading the software from pirated website. Why the users prefer using pirated software because of free/low cost rather than purchasing the license software which quite expensive.

**Table 8**: Not reluctant to use pirated software in the computer

| Response | Yes | No | Not Sure |
|---|---|---|---|
| Use Pirated Software | 63 (96.92%) | 1 (1.54%) | 1 (1.54%) |
| Cost | 63 (100%) | 0 (0%) | 0 (0%) |

In Table 9, showing majority of the respondent has used/heard about Linux, and among of their comment was the operating system easily can be downloaded from the internet and free. Also more than half of the respondent, 43 (66.15%) stated that they will try/change to Linux as their operating system (see Table 10).

**Table 9**: Have used/heard about Linux Operating system

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Yes | 43 | 66.15 |
| No | 8 | 12.31 |
| Not Sure | 14 | 21.54 |

**Table 10**: Will try/changes the operating system to Linux as alternative to Microsoft Windows

| Response | Respondent (65) | Percentage (100%) |
|---|---|---|
| Yes | 43 | 66.15 |
| No | 3 | 4.62 |
| Not Sure | 19 | 29.23 |

## Discussion

As indicated by BSA - The Software Alliance (2012, May 12), about 78% of computer users in Malaysia disclose that they have acquired pirated software in the 2011 BSA Global Software Piracy Study. Certain users say they pirate all or most of the period. Others say they do it infrequently or rarely. Software piracy is the illegal copying or distribution of copyrighted software. This can be done by copying, downloading, sharing, trade, or installing several copies onto personal or work computers. The issues have become like a plaque and installing pirated software become like a norms and for the user seem that is legitimate for them.

To overcome this plaque, the people should be educated the important regarding the intellectual property and this task should be embedded as early as possible. As a student, they has been expose to lots of software because the needs to use the software in teaching and learning process. The academician should counsel the student regarding using pirated software in their computer and provide list of alternative software for them. As cost become the main concern on purchasing the software license because of their attribute and when new license purchasing required for upgrading to latest version of the software. The respondent reluctant to purchase the license as they stated the amount of money for the license can be used for other purpose.

Because of the respondent already aware of the existence of open source software especially the operating system likes Linux. They should explore more on that and if there any issues or problems arise, they can ask for help and support from the open source community. Open source software fully backup by strong and devoted community because of their nature as the software development meant for the user itself also commercial company who sponsor the software. The community weren't being paid but the devoted to the open source because want the software to become better each release cycle by fixing the bugs and add more function to the software. Also requesting support from commercial company like Redhat and Caniocal, a small of fee required to the user and this is not for the license fee but for the support subscriptions.

In Table 11 showing the top 100 Linux operating distribution in Distrowatch (http://www.distrowatch.com/) , Bodnar (2013), respondent may choose any one of the distribution for their use.

**Table 11**: The list of top 100 Linux distributions in the world.

| | | | |
|---|---|---|---|
| Mint | Chakra | Descent\|OS | Semplice |
| Mageia | Kubuntu | ZevenOS | NetBSD |
| Ubuntu | Kali | Parted Magic | DragonFly |
| Debian | ROSA | Tiny Core | Trisquel |
| Fedora | antiX | Deepin | OpenBSD |
| openSUSE | Xubuntu | UberStudent | Salix |
| PCLinuxOS | Gentoo | DreamStudio | CRUX |
| Arch | Slax | Netrunner | LuninuX |
| Manjaro | Ultimate | Damn Small | Joli OS |
| Puppy | Red Hat | Clonezilla | aptosid |
| CentOS | Elive | Bridge | Wifislax |
| Zorin | elementary | MEPIS | Calculate |
| Bodhi | Peppermint | Korora | Solaris |
| Snowlinux | KNOPPIX | Slackel | Zentyal |
| OS4 | Pinguy | PureOS | Unity |
| CrunchBang | Porteus | Frugalware | SUSE |
| Slackware | Scientific | Linpus | Oracle |
| SolusOS | PC-BSD | GhostBSD | Absolute |
| Lubuntu | Mandriva | Vector | SliTaz |
| FreeBSD | Tails | wattOS | FreeNAS |
| Sabayon | BackBox | siduction | Super OS |
| Pear | ClearOS | Ubuntu GNOME | Macpup |
| SparkyLinux | Ubuntu Studio | Parsix | 2X |
| Lite | OpenELEC | Pardus | Zenwalk |
| Antergos | ArchBang | SystemRescue | AV Linux |

Computer owner have no reason to use the pirated software because the availability of the alternative operating system and also application software. In this scenario, the students should explore because it can help them in their future in using the alternative software. If they feel using pirated software is not an issues they are wrong because this habit can become part of them when they started to works. They should stop and never practise in their daily life and in their office. Prevention is must more better than cure.

## Conclusion

Open source operating system can be the alternative substituting the commercial/license operating system like Microsoft Windows. Linux operating system has becoming more users friendly and easy to use since it first introduce in 1991. More and more distribution of the Linux operating have emerge into the community and fully backup by the community and their sponsor. Now the main issues is to find the suitable Linux distribution that suit the user needs then they can just downloaded the ISO of that Linux distribution. Upgrading to newer version is much easier by just using the application inside the operating system and the cost for upgrading very cheap/free. Also Linux suitable to be installed in old computer because of the minimal requirement and even it can run by just using flash drive or cd.

Linux can be great beneficial to the society and this benefit needs to share with other and people who want this open source software continuity become better, their voluntary help is needed.

## Acknowledgement

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