Comparative Analysis of Windows and Linux

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Abstract— Linux being open source and free software is always the choice of open source community while windows being proprietary and closed source are preferred choice for personal computers. Both open and closed OS have their pros and cons, and with time compete with each other in providing solutions to such computing areas as personal computing, server management, mobile platforms. Each OS is different from other in terms of working, cost, security and stability. Each OS is filling the gap the other has to offer. In this paper a comparative analysis of Windows and Linux on the basis of cost, security, configurability and user friendliness is presented.

Keywords— Windows, Linux, Operating System, Security, User management.

I. INTRODUCTION

Linux and windows are two operating systems constantly competing with each other in the computer world. In this paper we are comparing these two operating systems with different properties. Windows is a proprietary operating system, which means that it is owned by a company and it has some copyrights. Windows code is not available for the end users; only the developers can modify and distribute the operating system. Linux is an open source operating system, its code is available for end users. Linux has its origin from UNIX. Linux was designed to provide personal computer users a free or very low-cost operating system. In windows program installation is an autonomous process. The installation process does not typically require an advanced knowledge of computers. While Linux installation is a bit technical. Linux are the most widespread operating systems available, the debate as to which platform holds superiority booms on. With Linux strongly becoming the adversary of the "Windows Empire", both operating systems are trying to compete each other consistently. Windows claims Linux has security issues, insufficient technical support, and instability. Linux developers, on the other hand, accuse that Windows is more prone to attack, unstable, inflexible and of lesser quality. As in everything else, the truth is always somewhere in the middle. Both have their advantages and disadvantages. In
This paper we will examine Linux and Windows on the basis of cost, security, configurability and user friendliness.

II. COMPARISON OF LINUX AND WINDOWS

Cost: Microsoft's operating systems being proprietary products are heavily priced with different price tags for different versions. Linux on the other hand is open source and free to acquire, modify and distribute and is licensed under the GNU General Public License. Any user can acquire most of the popular Linux versions almost free and modify the OS according to their needs. It is noteworthy, however that certain companies provide subscription based Linux support on an on-going base for their end users. A good example is Red Hat which offers Enterprise Linux subscription for varied users' needs [1].

Root login: As a window user the system administrator account is activated and being used as default making it one of the profound reasons to be infected with unwanted programs such as Trojans, viruses bloat ware and malware. Linux on the other hand provide defence against accessing the root functionality by encouraging the users to set up and use different user accounts without the need to actually access the root file system of the OS. The user can however access the root anytime by giving the root password but they will rarely need it for regular tasks. This increases the Linux System Security and makes it difficult for any accidental damages caused to the underlying OS infrastructure.

Code access: The source code for Windows is developed and maintained as a proprietary product and therefore the end user don't have any access to the source code of the OS. With Linux it's entirely different because it was built from ground up on open source policy so its code is free to modify, distribute and used according to the need of the end user. A user can modify and change the Linux OS almost completely if they want.

Graphical user interface: The graphical user interface was once the most important distinguishing feature of windows operating system making it really easy for the end user to interact with and use it. It has changed greatly from version 3.1 to Windows 98 and then Windows XP followed by Windows Vista, Windows 7 and recently Windows 8 versions. There are also a couple of third party themes to change the look and feel of the windows. Linux on the other hand remained mostly as a command based interface while at the same time being loaded with different GUI desktop environments from different vendors of which GNOME, UBUNTU and KDE are the widely popular alternatives

Security: Linux at its core is community driven which means that different users can contribute, enhance and upgrade the overall OS capabilities having the required skills and knowledge. It leads to more efficient checks and balances

because other users test and make adjustments to the source code until it is fully functional. It also helps to reduce errors and shortcomings because other users can thoroughly test a specific module and find and correct any shortcomings in the development. When any vulnerability of the system is detected or discovered during the course of its usage the Linux community collaborates to work through to find and rectify the threats and bugs and update the system making it more safe and secure. In comparison windows is closed which means that only Microsoft, its maker, can modify the source code while having little or no feedback from users and it leads to less checks and balances. The reason that most third party programs can easily gain access to the root file system makes it less secure and vulnerable to threats and attacks.

Windows vs. Linux servers: Linux servers are much more reliable and stable and they can continue to perform for a long time without any failure. It can handle heavy processes much efficiently with optimised performance and rarely do need any reboots because most of the configurations to the system can be made while the OS is running without affecting the other programs and functionality of the software. Linux is also slim, flexible and can be scaled to any length to accommodate the underlying hardware. Windows Server is a proprietary server management functionality which is developed and maintained by Microsoft only and therefore can only be updated or modified when Microsoft issues any upgrades. The other downside is that Windows Servers needs a lot of resources to fully function properly and if one needs to make any configuration to the system they usually have to reboot and apply the changes making it less robust. This also makes it less stable in some cases. Also the cost of applications is much higher than Linux because you have to purchase different software bundles while with Linux the same functionality can be acquired by acquiring open source products. Windows Server security is mainly dependent upon the correct privileges and usage of the system which if handled properly is nearly as good as the Linux. Security really depends more upon the server setup and administrators running the server.

User-Friendliness: Due to its user friendly interface Windows is widely adopted and used by a large number of people throughout the world as its GUI is consistent across all platforms. Ease of use makes Windows the operating system of choice in majority of user space like home users, educational institutions, government sectors and corporations. Its look and feel is consistent and easy to learn and use. Linux GUI on the other hand is varied and have different look and feel with so many desktop environments and still the command based interface is a major part making it difficult to be taught to common end user. Every Linux distribution utilizes different or unique ways to install their software which can potentially lead to a more difficult installation process and results in a dark cloud over Linux's user friendliness [2].

Drives don't have letters, they have mount points: Windows file system is categorised and managed by assigning different drive letters to different partitions of the disk. It makes it easy to store, access and retrieve the files from the hard disk drive. The external drives and devices are separately represented as different drive letters in a Windows desktop environment. In Linux however there is a single root file system whose path is "/", which represents the top root of the file system in a single layout. Every device or drive you connect in addition is mounted to a path which is under this root top as a separate media. There can be no files above the root directory in Linux. The underlying file structure of both the operating systems is also different from each other in many aspects. Linux uses ext2, ext3 file system while in windows the common file system in usage is FAT32 and NTFS.

Multiuser Operating System: Linux is a truly multi user operating system that allows multiple users to access and use the operating system at the same time. Windows in the recent versions also have this capability but the Linux approach is much more stable and robust and is used widely. As a Unix variant Linux can allow multiple user activity concurrently isolating each user session from the other one. It is more robust and functional than Windows [3].

Command line vs. no command line: The command line tool for Linux is an invaluable tool for administration and most Linux users are accustomed to its utilities and usage through the command line interface. This , though is not so helpful from common end user point of view because of the difficulty in learning different commands. The GUI environments for Linux like Ubuntu and Red Hat Enterprise along with a lot of other variants have solved that end user usability problem. Windows is usually credited with easy and intuitive GUI which end users can learn and use easily. You can also use command line utility in Windows if you want to but most of the time the GUI will suffice for most of the tasks

Configurability: Linux is backed by open source community of developers so it is robust and configurable for different modules and programs. The users can change, modify and configure the programs according to their needs and requirements as they wish without affecting the other parts of the OS. It is easily configurable and you can configure new settings and programs easily whenever you want without having the need to use extra resources and requirements. Windows system requires an upgrade of the version by Microsoft and if you want to add for example a new configuration like a security module, you have to go through a hectic system wide change. The configurations are not custom made and are difficult to modify or change [4].

Flexibility vs. rigidity: Linux is much more flexible than windows in terms of customisation and functionality. You can add, modify or change whatever you want in the system. Even the look and feel can be altered in different ways. On windows environment your options are limited in terms of changing look and feel of the system, you have to stick to the Microsoft Desktop Environment and if you want to change the look and feel you have to separately purchase third party applications [5].

III. ANALYSIS

From the above discussion we have analysed the different aspects of each operating system in terms of their structure, usability, function and interaction. The choice ultimately depends upon the end user requirements and needs. Both operating systems are used by a large number of people and both have different user base and market share. Linux is the

dominant choice as an open source cost effective option and due to its reliability and robustness in areas such as web servers, enterprise systems and strategic technology platform. A lot of big vendors use Linux as the core choice for their strategic needs for example companies like IBM and Oracle, financial institutions etc. Windows is a popular choice in home and office computing environments and also with new improved server management software it is widely used in strategic server management areas as well. Each operating system has its strengths and shortcomings and the decision to implement one of it really depend upon the needs and requirements of the end users. Generally Linux is a cost effective solution for home users and server management but it can't be easily maintained by the end user without the proper knowledge. Windows can be used for routine tasks easily and offers the capabilities which people are accustomed to in an easy way like the use of document editing, software usage and applications but it costs money and for most of the services you have to pay to use it.

IV.   CONCLUSION

Linux therefore is concluded to be an overall smart choice because its cost effective and open source and more secure. Although there is a learning curve to properly know and implement the system but this is the decision one has to make to reap the benefits of all the solutions to their needs. Specially in terms of an organisation overall IT infrastructure Linux is a more prudent choice because its robust, stable and easy to maintain while at the same time secure from most external threats and loopholes.

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