

Linux OS: The past, present and future

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Date: 9/30/14

Abstract: Thirty years ago, Bell Labs created UNIX. A young scholar named Linus started the idea of creating an open-source operating system called Linux. With it being open-sourced, the operating system evolved into several different variations and became more complex. Today Linux is being used in almost everything you have such as servers, mobile devices and desktop computers.

1 Introduction

Linux is an operating system that has made a huge impact in the computer industry. Many variations of Linux may be seen in a variety of applications such as servers, embedded systems, smart phones and tablets. The purpose of this writing assignment is to explore and research this revolutionary operating system. Topics such as the architecture, history, popularity, and maintenance of Linux will be explored. Debian, Redhat, Android and Raspberry Pi will also be mentioned [2].

2 History and Popularity

In order to understand the popularity of Linux, we have to look back 30 years ago. Computers were really big and each computer had a different operating system, which was customized to serve a specific purpose. Software on one system would not work on another system. This made it difficult for users and system administrators. Then in 1969, software developers in Bell Labs developed a new operating system called UNIX. At the time, only universities, the government and large financial corporations could get their hands on a UNIX system [4].

By the beginning of the 1990s, desktop computers were finally powerful enough to run UNIX. Linus Torvalds, a young man who studied computer science at University of Helsinki, worked on the idea of creating an academic version of UNIX [4]. From the start, it was Linus' goal to have a free system that was completely compliant with the original UNIX so he asked for the POSIX standards [4]. POSIX is something that we call an Application Programming Interface (API), which defines a set of programming interfaces used by applications [6]. On a lot of UNIX systems, the POSIX API calls have a strong correlation to system calls [6].

Today Linux has joined the desktop computer market. The Linux developers have recently started to make Linux an acceptable workstation choice by providing an easy user interface and Microsoft compatible office applications such as word processors, spreadsheets and presentations. On the server side, Linux is well known for being a stable and reliable platform, providing database and trading services for companies such as Amazon, US Post Office and many others [4]. Many Internet Service Providers (ISP) use Linux as firewall, proxy and web servers [4]. Linux may also run on mobile devices such as watches, mobile phones, and embedded applications.

3 Architecture

The Linux kernel includes device driver support for a large number of computer hardware devices such as graphic cards, network cards and hard disks. It also provides support for advanced processor and memory management features. The kernel, in raw binary form, is loaded directly into memory at system startup time and typically found in the file `/boot/vmlinuz` and its source files may be found in `/usr/src/linux` [7].

Linux may accept inputs through command line shells or through graphical interfaces (GUI) such as KDE and GNOME window managers [7]. On Linux, system utilities are powerful tools that do a single task extremely well so the user could solve problems by interconnecting these tools instead of writing a large application program. Linux distributions typically come with several useful application

programs as standard. Applications such as emacs editor, gcc compiler, StarOffice, latex and more are included in a Linux distribution [7].

4 Development and Maintenance

Linus Torvalds, the founder of Linux, had the vision of an open-source operating system that everyone could contribute to. As the Linux kernel and its applications become more widely used, an increasing number of system software developers are becoming more involved in the development and maintenance of Linux. Some engineers are motivated purely by personal interest, some work for Linux companies, some work for hardware manufacturers and some are involved with in-house development projects [6]. A common problem is the increasing complexity of the Linux kernel. With the system becoming more complex, the learning curve for the kernel is becoming longer and steeper. Linus Torvalds' solution to this problem is to keep the code clean with sensible interfaces, consistent layout and specialize in only one thing to do and to do it well [6].

5 Debian

Debian is an operating system that is composed of open-source software and developed under a group called the Debian project. It is one of the most popular Linux distributions for servers or computers, and it has been the base for several other Linux distributions [8]. In 1993, Ian Murdock announced Debian [8]. Then Debian's first stable release was made in 1996 [8]. A team of volunteers guided by a project leader and three foundational documents carries out the development. Debian has an automated patching system with the use of a single command to

update the entire system, including operating system and installed packages, over the Internet. [2]

6 Redhat

Red Hat Enterprise Linux isn't a free distribution. Its free version of Red Hat was converted to the Fedora Project [1]. The Fedora operating system has a much faster release cycle with the latest software to date. This kind of operating system is fine for desktop users. But it is not something that most corporate technology departments need, because they want an operating system that doesn't require frequent patches [1].

Red Hat's major source of revenue is support contracts. When your servers are not working properly because of an unknown bug, it is definitely useful to have paid engineers ready to fix the problem as soon as possible rather than depend on the community to come with the solution [1]. Companies will choose Red Hat over a free Linux system, because it gives them someone to readily solve their problems. With money involved, the engineers at Red Hat have no choice but to solve the problem as quickly as possible. Red Hat also makes money by training people and giving certifications like RHCT and RHCE [1].

7 Raspberry Pi

The Raspberry Pi is a low-powered inexpensive, credit card sized computer that can use a computer monitor, a keyboard and mouse. It enables people of all ages to explore computing and allows the user do everything that you may expect a desktop computer to do. It supports a vast array of lightweight Linux operating systems, but

Raspbian (Debian Wheezy) is the most popular operating system used on the Raspberry Pi. It definitely has the bare minimum amount of software packages, but you can always install more if needed. It has the ability to interact with the outside world and has been used in a wide variety of projects. The community for the Raspberry Pi is big and still growing with a vast array of different projects. The applications using Raspberry Pi are endless. I used the Raspberry Pi to control instruments and automate tests from here in University of Hawaii to test equipment in Indiana University.

8 Conclusion

As you can see, Linux has made a huge impact on the computer industry with many different applications. Linux was known for being a stable and reliable platform by providing database and trading services for Amazon, US Post Office and many others [4]. Many Internet Service Providers (ISP) use Linux as firewall, proxy and web servers [4]. It may also run on mobile devices such as watches, mobile phones and embedded applications. Linus Torvalds's vision of creating an open-source operating system remained true today with Linux operating systems such as Debian existing today. Red Hat used the free open-source operating system concept to debug their free operating system called Fedora and create a commercialized Red Hat operating system that did not require frequent patches. Linux is even used as the operating system for a low-powered inexpensive, credit card sized computer, called the Raspberry Pi. The community for this device has grown and many new projects have emerged.

9 References

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