

# Unix – Advantage and Disadvantage

Duc Truc Lam Le  
Swinburne University of Technology  
Hawthorn VIC, Australia  
103529388@student.swin.edu.au

**Abstract**—This report aims to provide a brief overview of the advantages and disadvantages of the operating system Unix, comparing with a more commonly used operating system, Windows, in deploying on a cloud system.

## I. INTRODUCTION

Developed in the 1970s by AT&T, Unix is the first operating system to be written completely in C programming language, which allows more flexibility in hardware. Since then, it has spawned numerous derived operating systems which include BSD and Linux [1], and has been powering several systems including, but not limited to, servers, computers, mobile and embedded devices. Recently, this operating system is also a choice for implementation on cloud computing platforms due to its advantages in security, scalability and availability, which are important criteria for such a high demand computing system like the cloud [2]. Nonetheless, compared to other operating systems, Unix does have its limitations. Both the advantages and disadvantages of Unix in the cloud will be discussed in this report.

## II. ADVANTAGES OF UNIX

### A. Security

Compared to a Windows system, Unix has some strengths in the aspect of access control and managing system services. Unix OS implements a so-called “Mandatory Access Control” (MAC) which prevents files from being accessed illegally. A file created on an MAC-implemented OS will have a “security label” accompanied with it. This label will ensure that regardless of whether the owner of the file has changed, the new owner will not be able to modify the permission of the file, thus preventing unauthorized file sharing, especially secret documents. Meanwhile, this mechanism is not implemented on Windows, which permits the owner to share and assign new permission freely, exposing the file to malicious users [3].

In addition, regarding the process of system services management, Unix tends to be far more secure than Windows. The OS developed by Microsoft seems to have all the system services like network, application, and file management all linked to a centralized Resource Procedure Call (RPC). This poses a risk of the whole system being taken over by a hacker when that hacker is able to gain access to the RPC. This is not the case in Unix, where most of the system services operate independently between each other and with the OS. This does not only prevent malicious users from taking the full control of the whole system services, but also enables users to fix individual services without having to stop the whole OS [4]. For a high-demanding computer system like the cloud computing platform, keeping the system both secure and reliable is crucial, and Unix ensures both by the above-mentioned characteristics.

### B. Cost

While Unix is not free and requires licensing, many Unix-like derivatives are open-source and free to use like BSD and Linux [5] [6]. Meanwhile, a Windows Server standard license

costs a hefty amount of 1069 USD per license, while the Datacenter version requires a payment of 6155 USD to use [7]. This results in a more costly cloud deployment if the enterprise decides to go with Windows. For instance, the hosting service GoDaddy lists both options of using Windows and Linux for hosting websites, with the starting price of a Windows hosting plan being 11.5 AUD per month, which is nearly twice the price of a similar Linux plan [8] [9].

### C. Software

This is considered both advantages and disadvantages of Unix. The Unix-like OS Linux is said to be more friendly in terms of deploying web services due to its simplicity in installing software required for web hosting including Apache, PHP, MySQL and NodeJS. It is also worth knowing that the web content management system WordPress is far easier to install on Unix than on Windows [10] [11]. Many of those applications are open source and free to use, which contributes to the reduction of cost when building a cloud system with Unix and its variants [12].

## III. DISADVANTAGES OF UNIX

### A. Software

As mentioned above, software is the strength and also the weakness of Unix. If a developer chooses to write a web application in ASP.NET, the only choice for that developer is Windows. Windows is also the sole selection for an enterprise wanting to store their data on Microsoft SQL server [10]. Due to this reason, users should consider what software they will be using when deciding between Windows and Linux for their cloud server.

### B. Usability

In this particular criterion, Windows is the clear winner. Unix is mostly command-line based, which makes it more difficult to manage compared to the GUI-based Windows [13]. Of course, Unix can have different GUIs installed such as GNOME, KDE Plasma, or XFCE, but server-oriented Unix often comes with only command line interface in order to minimize the unnecessary resource usage on the server's hardware, and installing GUI takes some time and still requires some command line knowledge [14]. Furthermore, installing GUI for Unix on a real server would not only cause performance degradation, but also cause system issues when the GUI is altered or removed later [15].

### C. Support

The expensive cost of Windows comes with a merit: support. Windows users are more in peace of mind knowing that there will be several ways to contact Microsoft in case issues arise with their Windows devices, from live chat to phone call. Also, being a popular operating system, it is also easier to find support for Windows at many computer service providers [16]. Meanwhile, being an open-source OS, Unix is dependent on its enthusiastic community in finding and fixing issues, in contrast with Windows which has a big group of people getting paid to diagnose and troubleshoot the OS [16].

If an issue arises when using Unix, users need to either fix the problem by themselves, or asking for help from the Unix community which takes time and may delay the server operation, and the answer may not be trustworthy as well. The last option is to hire a Unix technician to resolve the issue, but that will add to the cost in managing the server [13], denying the benefits of Unix over Windows in financial expense.

#### IV. CONCLUSION

Both Unix and Windows have their own unique strengths and weaknesses in deploying and managing a cloud server system. Unix is superior in providing security for the cloud, in addition to having lower deployment cost and compatible with many network service software like web hosting, database, and web application. Meanwhile, Windows also has its own network software that Unix does not have, while also defeating Unix in ease of use and getting support when problems occur. Ultimately, it is up to users in selecting which operating system to use for their cloud system. If the user favors the safety of their data, wanting to minimize the cost in developing a cloud system, or running some specific network services software like PHP or MySQL and have some knowledge on configuring Unix system, then Unix will be the best choice. On the other hand, if the user wants a simple GUI-based operating system, requiring good support or running Microsoft-made software like MSSQL or ASP.NET, then it is recommended to go with Windows.

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