

**Information Search and Analysis Skills  
(ISAS)**

**“Debian Buster: Advantages and Disadvantages”  
Operating system**



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## **PREFACE**

We wish to express our profound gratitude to Almighty God for His boundless mercy and grace, which have been instrumental in the successful completion of this manuscript entitled "Debian Buster: Advantages and Disadvantages." This manuscript represents the culmination of extensive research and academic effort, undertaken as part of the Center of Excellence Program (CEP) at the Center for Computing and Information Technology (CCIT), Faculty of Engineering, University of Indonesia.

This scholarly work delves into the comprehensive analysis of the Debian Buster operating system, examining its advantages and disadvantages within the context of modern computing environments. Through meticulous research and analysis, this manuscript provides an in-depth evaluation of Debian Buster, highlighting its key features and its impact on the field of information technology.

The manuscript offers a detailed exploration of Debian Buster's architecture, its operational mechanics, and its relevance in today's technological landscape. It elucidates how Debian Buster's design and functionalities cater to the needs of users, developers, and administrators, influencing both system performance and security. Additionally, it addresses the broader implications of using Debian Buster in various computing scenarios, including server environments, desktop usage, and embedded systems.

We sincerely hope that this manuscript will serve as a valuable resource for researchers, students, and professionals in the field of computing. It is our intention that this work will contribute to a deeper understanding of Debian Buster and its significance in the realm of information technology.

We extend our heartfelt thanks to all those who have provided unwavering support and guidance throughout the preparation of this manuscript. Our gratitude is especially directed towards our esteemed colleagues at CEP-CCIT, Faculty of Engineering, University of Indonesia, whose expertise and encouragement have been invaluable in the realization of this academic endeavor.

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# **CHAPTER I**

## **INTRODUCTION**

### **1.1 Background**

Debian is one of the oldest and most respected Linux distributions, known for its stability, security, and active developer community. In 2019, Debian released version 10, codenamed "Buster." This version brought various improvements in performance, hardware compatibility, and new features. One of the latest updates in this series is Debian Buster 10, released as part of ongoing updates to enhance the system's stability and security.

Debian Buster 10 is widely used in both server and desktop environments, making it an attractive choice for users and system administrators seeking a reliable open-source solution. However, like any operating system, Debian Buster has its own set of strengths and weaknesses.

An in-depth analysis of Debian Buster 10 is essential to understand how this update affects system performance, software compatibility, and the overall user experience. This discussion will explore the advantages and disadvantages of Debian Buster 10 and how this version compares to other Linux distributions.

### **1.2 Writing Objective**

**Assessing Advantages and Disadvantages:** The objective of this writing is to identify and evaluate the advantages and disadvantages of Debian Buster 10 within the context of practical use. This assessment aims to provide valuable guidance for users, system administrators, and developers in determining whether this version meets their needs and expectations. Through a detailed analysis, it is hoped to offer clear insights into the strengths of Debian Buster 10 as well as areas that may require further attention, thereby assisting in making more informed decisions regarding the adoption and implementation of this operating system.

### **1.3 Problem Domain**

The problem domain in the topic of Debian Buster 10 focuses on advantages and disadvantages in version 10 address the issues and limitations present in previous Debian releases. Additionally, it will discuss how these improvements affect the overall performance and functionality of the operating system.

This examination includes an analysis of the enhancements introduced in Debian Buster 10 exploring how they contribute to solving existing challenges and advancing system capabilities. The discussion will cover the impact of these changes on system stability, security, and user experience, providing a comprehensive overview of both the advantages and disadvantages of this particular release.

### **1.4 Writing Methodology**

The methodology for this script is evaluative analysis, focusing on providing a detailed and comprehensive account of Debian Buster 10. This approach aims to present an in-depth exploration of the operating system by describing its advantages and disadvantages in a clear and informative manner.

### **1.5 Writing Framework**

#### **Chapter 1: Introduction**

Include background of Debian Buster 10, writing objective, problem domain, and writing methodology.

#### **Chapter 2: Basic Theory**

Contains brief description of Debian Buster 10.

#### **Chapter 3: Problem Analysis**

Discussion of advantages and disadvantages of Debian Buster 10.

#### **Chapter 4: Conclusion and Suggestion**

Conclusion and suggestion to take from it.

## **CHAPTER II**

### **BASIC THEORY**

#### **2.1 What Is Operating System (OS)**

An operating system is a type of system software that plays a crucial role in managing all of a computer's resources. It acts as a bridge between software and the various components of computer hardware. The primary function of an operating system is to oversee and comprehensively manage the computer's resources and operations, ensuring all components work together efficiently.

Essentially, an operating system is a cohesive set of specialized programs designed to control the entire functioning of a computer. It regulates and monitors the execution of all other programs within the computer, including both application software and other system software. This includes managing critical components like memory, the processor, and input/output (I/O) devices, ensuring that programs run without interfering with each other. Additionally, the operating system functions as a resource manager, distributing computational tasks between different applications and users efficiently.

Some of the most commonly used operating systems around the world include Windows, Linux, and Mac OS. Each of these systems has its own characteristics and strengths, but they all serve the purpose of providing an interface that facilitates user interaction with hardware and allows various computer programs to run.

In essence, an operating system (OS) is a suite of software that manages the hardware resources of a computer and provides essential services for running various programs. Without an operating system, other programs wouldn't be able to function properly, as they need an intermediary to manage access to resources like memory, storage devices, and network hardware. Therefore, the operating system is the most critical type of software within any computer system. It ensures the computer operates optimally, enabling interaction between hardware, software, and users in an organized and efficient manner.

## 2.2 What is Debian Linux



Debian is an open-source and free Linux operating system developed and distributed by the Debian Project; a community founded in 1993 by Ian Murdock. Known for its stability and security, Debian is based on the Linux kernel and provides over 59,000 precompiled and tested software packages. These packages include system software, server applications, and desktop applications such as web browsers, office tools, and games. Debian offers various versions, including Debian GNU/Linux, Debian GNU/kFreeBSD, and Debian GNU/Hurd.

Debian GNU/Linux is distributed using an open-source development model and is managed by a dedicated team of developers. This team, comprising thousands of volunteers worldwide, contributes to Debian's development, translation, and documentation. A distinctive feature of Debian is its package management system, the Advanced Packaging Tool (APT), which facilitates easy and efficient installation, removal, and management of software packages.

Additionally, Debian is renowned for its rigorous testing process before releases, ensuring system stability and security. The Debian community is large and active, providing support and assistance to users. The community also organizes meetings and online discussions to share knowledge and experiences related to Debian.

## 2.3 Debian Linux Versions

Below are the types of Debian Linux:

- Debian 1.1 (Buzz), Release Date: June 17, 1996
- Debian 2.0 (Hamm), Release Date: July 24, 1998
- Debian 3.0 (Woody), Release Date: July 19, 2002
- Debian 4.0 (Etch), Release Date: April 8, 2007
- Debian 5.0 (Lenny), Release Date: February 14, 2009
- Debian 6.0 (Squeeze), Release Date: February 6, 2011
- Debian 7.0 (Wheezy), Release Date: May 4, 2013
- Debian 8.0 (Jessie), Release Date: April 25, 2015
- Debian 9.0 (Stretch), Release Date: June 17, 2017
- Debian 10.0 (Buster), Release Date: July 6, 2019
- Debian 11.0 (Bullseye), Release Date: August 14, 2021
- Debian 12 (Bookworm) [Upcoming], Release Date August 31, 2024



## CHAPTER III

### PROBLEM ANALYSIS

#### 3.1 What Is Debian Buster 10



Debian 10, code-named Buster, is a significant update from its predecessor, Debian 9 (Stretch), and has introduced a number of new features and updates. Debian 10 Buster continues the tradition of providing a robust and reliable Linux distribution with long-term support. It is supported with security updates and maintenance for at least 5 years from its launch.

In terms of security, Debian Buster includes various updates to address vulnerabilities and provide a secure operating environment. The distribution adheres to Debian's commitment to security with regular updates and patches. Additionally, Debian Buster offers long-term support, with maintenance and security updates guaranteed for at least five years from its release date. This long-term support ensures continued stability and security, reducing the need for frequent upgrades.

The release also includes updated versions of major desktop environments such as GNOME, KDE Plasma, Xfce, and LXDE, enhancing the user experience through improvements in visual design and usability. Overall, Debian Buster continues to be a reliable and versatile choice for users seeking a stable Linux distribution with long-term support.

### 3.2 What's New in Debian Buster V.10

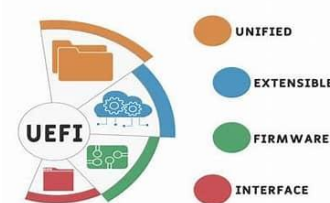
- GNOME Uses Wayland now



In Debian 10 "Buster," the GNOME desktop environment defaults to using the Wayland display server protocol instead of the traditional X.Org Server (X11). Wayland represents a significant advancement in graphical technology, offering a more modern and efficient design. By simplifying the communication path between the display server and applications, Wayland reduces overhead and improves performance, resulting in smoother graphics and better resource utilization. Additionally, Wayland enhances security by enforcing stricter isolation between applications, preventing unauthorized access to input and output data.

This shift to Wayland aligns Debian Buster with contemporary best practices in desktop environments, reflecting a commitment to modernizing the graphical stack. While Wayland provides numerous benefits, including improved support for high-DPI displays and better touch input handling, users can still opt for X.Org Server if compatibility with specific applications is required. This dual support ensures that Debian Buster accommodates both cutting-edge and legacy needs.

- UEFI Secure Boot Enabled



In Debian 10 "Buster," a significant enhancement is the integration of UEFI Secure Boot support, a feature that bolsters the system's security by preventing the loading of unsigned code. Secure Boot is a UEFI firmware feature designed to protect against malicious software, such as rootkits and bootkits, which can compromise the boot process. By ensuring that only signed and trusted code is executed during the system startup, Secure Boot adds a critical layer of defense against unauthorized modifications to the operating system and firmware.

With Debian Buster's support for Secure Boot, users no longer need to implement workarounds to install the operating system on systems that have Secure Boot enabled. This seamless integration simplifies the installation process, making it more straightforward and secure for users deploying Debian on modern hardware. The inclusion of Secure Boot support reflects Debian's commitment to enhancing security and aligning with contemporary hardware standards, providing users with a more secure and reliable computing environment right from the installation phase.

- AppArmor Enabled by Default



In Debian 10 "Buster," AppArmor is now enabled by default, marking a significant enhancement in the distribution's security framework. AppArmor is an access control framework designed to impose stringent restrictions on the capabilities and permissions of applications. It operates by loading predefined security profiles into the kernel, which then govern the behavior of various programs according to the specified rules. This approach helps mitigate the risk of potential security breaches by constraining applications to only the necessary resources and operations, thereby minimizing the impact of any vulnerabilities that might be exploited.

Debian 10 improves upon previous releases by not only including AppArmor but also activating it out-of-the-box. It ships with a set of pre-configured profiles for commonly used applications, including Apache, PHP, Bash, and Python. These profiles are designed to enforce security policies tailored to each application's needs. For users requiring additional coverage, the `apparmor-profiles-extra` package can be installed to provide more comprehensive profiles for a broader range of applications. This default activation of AppArmor enhances Debian's security posture by ensuring that critical applications are protected from potential threats right from the initial installation.

- /usr Merge On Fresh Installs

```
/
|-- etc
|-- usr
|   |-- bin
|   |--/sbin
|   |-- lib
|   |-- lib64
|-- run
|-- var
|-- bin -> usr/bin
|--/sbin -> usr/sbin
|-- lib -> usr/lib
|-- lib64 -> usr/lib64
```

In Debian 10 "Buster," a significant change for fresh installations is the merging of the `/usr` directory with several other critical directories. Specifically, during a new installation, the contents of `/bin`, `/sbin`, and `/lib` will now be located in `/usr/bin`, `/usr/sbin`, and `/usr/lib`, respectively. To ensure compatibility with existing scripts and programs that expect these traditional directories, `/bin`, `/sbin`, and `/lib` will be set up as symbolic links pointing to their new locations in `/usr`.

This change is part of an effort to simplify and unify the filesystem hierarchy, making it more consistent and easier to manage. For users upgrading from previous versions of Debian, there will be no automatic changes to the directory structure. However, if desired, you can use the `usrmerge` package to update your system to this new layout. This update can help streamline system administration and ensure better alignment with contemporary Linux filesystem standards.

- Apt Updates



In Debian 10 "Buster," APT has received notable improvements that enhance its functionality and ease of use. The system now supports HTTPS repositories by default, so there's no need to install the `apt-transport-https` package separately to use secure HTTPS connections for adding and managing repositories. This streamlines the process and simplifies the use of repositories that require secure communication.

Additionally, if you enable the `unattended-upgrades` package, Debian will now handle upgrades to new point releases automatically. Previously, `unattended-upgrades` only applied security updates, but with this update, it can also manage upgrades to new point releases, ensuring that your system stays current with both security patches and other important updates without requiring manual intervention.

- Nftables Replaces Iptables

One of the most significant changes in Debian 10 "Buster" is the replacement of the `iptables` firewall subsystem with `nftables`. This update is important because `nftables` offers improved performance and better support for handling both IPv4 and IPv6 traffic simultaneously. It also includes advanced features like built-in support for managing data sets, such as dictionaries and maps, which can enhance firewall rules and configurations.

For users who have existing `iptables` scripts, Debian Buster provides a way to maintain compatibility. You can use the `iptables-nft` command to ensure that your old `iptables` rules continue to work. For those transitioning from `iptables` to `nftables`, there are resources available to help guide you through the process of updating your firewall setup.

- Python 2 Deprecated



In Debian 10 "Buster," Python 2 is still included, but it is officially deprecated as of January 1, 2020. This means that while Python 2 is available in Buster, it is no longer actively maintained or supported, and it is planned to be removed in the next Debian release. If you have code or applications that rely on Python 2, it is strongly recommended to start transitioning to Python 3. Python 3 offers ongoing support and improvements, making it the preferred choice for current and future projects.

- Linux Kernel 4.19



The 4.19 kernel introduces several significant improvements over previous versions. It adds support for virtual GPUs, which enhances graphics capabilities for virtualized environments. There are also improvements for managing large-scale SSD-based swap storage and updates to the Ext4 filesystem for better performance. Additionally, the kernel now supports up to 4 petabytes of physical memory, a huge increase from the previous 64 terabyte limit. It also includes important security updates to address vulnerabilities such as Meltdown and Spectre, which affect modern processors.

### 3.3 Advantages of Debian Buster 10

Here are the advantages of using Debian Buster version 10:

1. Stability and Reliability:

Debian Buster is renowned for its exceptional stability, making it a dependable choice for long-term use. The system is designed to avoid frequent major updates or changes that could disrupt its operational stability.

2. Enhanced Security:

- Debian 10 places a strong emphasis on security. It includes AppArmor by default, a mandatory access control framework that restricts program capabilities, thereby reducing potential vulnerabilities.
- Additionally, improved support for UEFI (Unified Extensible Firmware Interface) and Secure Boot provides extra layers of protection, especially on modern hardware.

3. Flexible Display Server Options:

Debian Buster defaults to the Wayland display server, which offers a more modern and secure design. However, users can still opt to use the traditional Xorg server, providing flexibility in configuring their desktop environment.

4. Diverse Desktop Environment Choices:

Debian 10 comes with seven major desktop environments: Cinnamon, GNOME, KDE Plasma, LXDE, LXQt, MATE, and Xfce. This variety allows users to choose an environment that best fits their preferences and needs, whether they prefer the modern feel of Cinnamon or the lightweight, traditional look of Xfce or LXQt.

5. Driverless Printing Convenience:

Debian Buster simplifies printing with driverless support through pre-installed CUPS and cups-filters packages. This setup allows for easy network printing and IPP printer use without the need for non-free vendor drivers, reducing hassle for the user.

6. **Broad Hardware Compatibility and Support:**

Debian Buster offers Secure Boot support for amd64, i386, and arm64 architectures, ensuring it works out of the box on most Secure Boot-enabled machines. This enhances compatibility across a wide range of hardware.

7. **Traditional Approach Appeals to Experienced Linux Users:**

Debian prioritizes stability and reliability over cutting-edge software versions, aligning with the traditional Linux philosophy. This approach not only appeals to seasoned Linux users who value a stable system but also provides new users with confidence in the system's ease of use and dependability.

Debian Buster version 10 is a strong choice for users who prioritize stability, security, and flexibility in their desktop environment, despite some trade-offs in software updates and minor technical issues.

### **3.4 Disadvantages of Debian Buster 10**

Here are the disadvantages of using Debian Buster version 10:

1. **Limited Hardware Support**

Linux Debian OS, while renowned for its stability and robust performance, may encounter challenges with hardware compatibility. Certain types of hardware, particularly newer or less common models, may not be fully supported out of the box. This limitation often necessitates additional effort to identify and install compatible drivers or firmware, which can pose difficulties for users attempting to integrate specialized or cutting-edge hardware into their Debian-based systems.

2. **Complex Installation Process**

The installation of Linux Debian OS can be intricate and demanding, requiring a considerable level of technical proficiency. Unlike some operating systems with streamlined and user-friendly installation wizards, Debian's installation process may involve detailed configuration steps and an understanding of system components. This complexity can present significant challenges for individuals who are not well-versed in system administration or who lack prior experience with Linux environments.

3. **Limited Accessibility for Novice Users**

Debian OS, due to its design philosophy and configuration options, may not cater as readily to users who are new to Linux or computing in general. Compared to more mainstream operating systems such as Windows or macOS, Debian's interface and operational paradigms can appear less intuitive and more complex. As a result, users with minimal technical expertise might find Debian more challenging to navigate and utilize effectively.

#### 4. Restricted Application Support

While Debian OS boasts a comprehensive repository of software packages, the range of available applications may not always align with the needs of all users. Certain types of applications, particularly proprietary software or high-demand games, may have limited support or availability on Debian. This restriction can impact users who require specific commercial software or who seek a wide variety of gaming options.

#### 5. Vendor Support Limitations

The support from hardware and software vendors for Linux Debian OS can be inconsistent. Some vendors may not provide official drivers or software tailored for Debian, which can complicate the process of obtaining necessary components for optimal system performance. Users may need to rely on community-driven solutions or manually configure compatibility, which can be time-consuming and technically challenging.

### 3.5 Debian Buster Improvisation From the Previous Version

Debian 10 "Buster" introduced key improvements over Debian 9 "Stretch":

- **Kernel Upgrade:** Debian 10 uses Linux kernel 4.19, providing better hardware support, especially for ARM devices.
- **Nftables Firewall:** Nftables replaced iptables, offering a more efficient and user-friendly firewall management.
- **Secure Boot:** Added Secure Boot support for easier installation on modern UEFI systems.
- **Python 3 Transition:** Emphasized Python 3 over the deprecated Python 2, marking a modernization of the platform.
- **Calamares Installer:** Simplified installation via the Calamares graphical installer.

These changes focused on security, usability, and better hardware compatibility.

## **CHAPTER IV**

### **CONCLUSION AND SUGGESTION**

#### **4.1 Conclusion**

Debian Buster version 10 is a powerful and reliable Linux distribution that stands out for its stability, security, and long-term support. It is particularly well-suited for users who value a robust system that prioritizes dependability over cutting-edge software updates. Debian Buster offers a range of desktop environments, enhanced security features like App Armor and Secure Boot support, and convenient functionalities such as driverless printing.

However, Debian Buster also has its drawbacks. It may present challenges in terms of hardware compatibility, especially with newer or less common devices. The installation process can be complex and may require a higher level of technical knowledge, which could be a barrier for novice users. Additionally, the availability of certain proprietary applications and gaming options may be limited, and vendor support for Debian can be inconsistent.

Overall, Debian Buster is an excellent choice for experienced Linux users who prioritize stability and security, but it may pose difficulties for those who require more straightforward installation processes, broader hardware support, or access to a wider range of proprietary software.

#### **4.2 Suggestion**

Here are concise suggestions for using Debian Buster 10:

- **Check Hardware Compatibility:** Verify if your hardware is supported by Debian Buster. Some newer or less common hardware may require additional drivers or community support.
- **Prepare for Installation:** Debian's installation can be complex. New users should review guides or seek help to navigate the detailed setup process.
- **Consider User Experience:** Debian may be challenging for beginners. Exploring user-friendly derivatives or additional resources could ease the transition.
- **Assess Software Availability:** Ensure Debian meets your software needs. Some proprietary applications or popular games might not be available, so check compatibility beforehand.
- **Plan for Vendor Support:** Vendor support for Debian may be limited. Be prepared to use community solutions or manual configuration for drivers and software.

These steps can help you better evaluate if Debian Buster 10 is the right choice for your needs.



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