

F, Ubuntu 20.04 primarily uses ext4 as its default filesystem.

ext4 is the standard and recommended filesystem for Ubuntu 20.04 during installation.

Because of the following reasons

It offers a good balance of performance, reliability, and features. It's generally faster and more efficient than its predecessor, ext3.

ext4 is a journaling filesystem, which means it keeps a log of changes before they are written to the disk. This significantly improves recovery time in case of a system crash or power outage.

It's a mature and well-tested filesystem, making it a stable choice for most users.

Supports large file sizes and volumes, and has features like extent-based allocation, which improves performance for large files.

It is well-supported by Ubuntu and the Linux ecosystem.

Strikes a good balance between features and resource usage.

Ext4 is easy to set up and manage, making it user-friendly for both novice and experienced users.

In general, ext4 is the best choice for your primary Ubuntu system partition due to its performance, reliability, and journaling capabilities.

Other filesystems like NTFS, exFAT, FAT32, HFS+, and APFS are useful for compatibility with other operating systems and external storage devices, but they are not typically used as the primary filesystem for Ubuntu.

Btrfs and ZFS are advanced filesystems that can be used if you need their specific features, but they are not the default choice for Ubuntu 20.04.

G, Advantage and disadvantage

Advantages of Ubuntu 20.04 LTS

1. Long-Term Support: Ubuntu 20.04 receives five years of support including security updates and bug fixes, making it a stable choice for long-term projects.
2. User-Friendly Interface: It provides a modern user interface, which is accessible for

both beginners and experienced users.

3. Performance Improvements: The Linux kernel 5.4 offers better hardware support and performance optimizations, leading to improved system responsiveness and efficiency.

6. Community Support: users can find help easily through forums, documentation, and other resources.

3. Hardware Compatibility: Ubuntu generally has excellent hardware compatibility, supporting a wide range of devices and components.

5. Security: It is known for its strong security features and prompt security updates, protecting against vulnerabilities and threats, including full disk encryption and improved privacy settings, help protect user data.

7. Cost-Effective: As a free and open-source operating system, Ubuntu eliminates licensing fees, making it a cost-effective choice for individuals and organization.

11. Developer-Friendly: Ubuntu is a popular choice for developers, offering a wide range of development tools, libraries, and frameworks.

Disadvantages of Ubuntu 20.04 LTS

1. Learning Curve for New Users: While Ubuntu is user-friendly, new users coming from a Windows or macOS background may still face a learning curve when adapting to Linux.

3. Hardware Compatibility Issues: While Ubuntu supports a wide range of hardware, some specific devices may not have drivers readily available, leading to potential compatibility issues.

5. Frequent Updates: While updates are generally beneficial, some users may find the frequency of updates disruptive.

6. Dependency Management: Although the package management system is robust, dependency issues can occasionally arise when installing software from third-party sources.

H, Conclusion

In conclusion, Ubuntu 20.04 LTS (Focal Fossa) stands as a robust and well-supported operating system, offering a stable and user-friendly experience suitable for a wide range of users, from beginners to experienced professionals. Its long-term support, coupled with performance improvements and a strong community, makes it a compelling choice for both desktop and server environments. While new users may

encounter a slight learning curve and potential hardware compatibility issues, the advantages of Ubuntu 20.04 LTS, including its cost-effectiveness, security features, and developer-friendly environment, generally outweigh the drawbacks. As Ubuntu continues to evolve with future releases like Ubuntu 24.04, it remains a significant player in the open-source operating system landscape.

J, future outlook/recommendations

future outlook

Declining Relevance (Without ESM): As time progresses towards April 2025, and especially after that date, the relevance of Ubuntu 20.04 without Extended Security Maintenance will diminish.

Viable Option (With ESM/Ubuntu Pro): If you have a specific, compelling reason to stay on 20.04 and are willing to pay for Ubuntu Pro (or use the free Personal Ubuntu Pro for up to 5 machines), then it remains a viable option. The ESM provides critical security updates, extending its lifespan.

Recommendations

1, Upgrade to a Newer LTS Release (Recommended): This is the strongly recommended path for most users. Upgrade to the latest LTS release

2, Clean Install of a Newer Release: If you're experiencing significant problems with your current system, or if you want a fresh start, a clean install of a newer Ubuntu version is a good choice. Backup your data before doing this.

3, Migrate to a Different Linux Distribution: If you're open to it, consider exploring other Linux distributions. Distributions like Linux Mint, Fedora, or Debian are popular alternatives.

2) i, What is virtualization in modern operating system

Virtualization in modern operating systems refers to the ability to create and manage virtual instances of hardware resources, allowing multiple operating systems to run concurrently on a single physical machine. This technology is widely used in both server and desktop environments and plays a critical role in cloud computing, data centers, and development environments.

II, why do we use virtualization in operating system

Virtualization is widely used in modern operating systems for several key reasons:

1. Resource Optimization: It maximizes hardware utilization by allowing multiple virtual machines (VMs) to run on a single physical server, reducing overhead.

2. Isolation: VMs operate independently, enhancing security and stability by preventing application conflicts.

3. **Flexibility and Scalability:** Resources can be dynamically allocated based on demand, supporting diverse environments and easy scaling.
4. **Simplified Management:** Centralized management tools and automation streamline administrative tasks.
5. **Cost Savings:** Fewer physical servers lead to reduced hardware, energy, and maintenance costs.
6. **Disaster Recovery:** Easy VM snapshots and migration facilitate quick recovery from failures.
7. **Testing and Development:** Isolated environments allow for efficient application testing without affecting production systems.
8. **Legacy Support:** Virtualization enables running older applications in compatible environments.

III, How do we use virtualization

Key Components

1. **Hypervisor:** The core software that manages virtual machines (VMs). There are two types:
 - Type 1 (Bare-metal): Runs directly on hardware (e.g., VMware ESXi).
 - Type 2 (Hosted): Runs on an existing OS (e.g., VMware Workstation).
2. **Virtual Machines (VMs):** Software-based emulations of physical computers, each with its own OS and applications, isolated from one another.

How Virtualization Works

1. **Resource Abstraction:**
 - The hypervisor abstracts physical resources (CPU, memory, storage) into virtual resources. This allows multiple VMs to share the same physical resources efficiently.
2. **VM Creation:**
 - When a VM is created, the hypervisor allocates a portion of the physical resources to it. This can include defining how much CPU power, memory, and disk space it will use.
3. **Isolation:**
 - Each VM operates in its own environment, with its own OS and applications. The

hypervisor ensures that VMs are isolated from one another, enhancing security and stability.

4. Execution:

- When a VM runs an application, the hypervisor translates the VM's requests for resources into commands for the physical hardware. This may involve translating virtual CPU instructions into physical CPU instructions.

5. Management:

- Hypervisors provide management tools for creating, configuring, starting, stopping, and deleting VMs. They also allow for snapshots (saving the state of a VM) and cloning (creating copies of VMs).

6. Dynamic Resource Allocation:

- Many hypervisors support dynamic resource allocation, allowing resources to be adjusted in real-time based on demand. For example, if one VM needs more memory, it can be allocated from a pool of available resources.