

### Comparative study of Latest Windows 11, Linux (Ubuntu 24.04), Mac OS Sonoma

Feature	Windows 11	Linux (Ubuntu 24.04)	macOS Sonoma (14.x)
Source Model	Closed Source	Open Source	Partially Open Source (Darwin)
Hardware Cost	Requires licensed OS, high hardware cost	Free OS, runs on low-cost hardware	macOS runs only on Apple hardware (high cost)
Drive Naming	Uses *C:, D:* to store files and folders	Uses / (root) and mounts drives to folders	Uses Volumes folder for mounted drives
Device Management	Printers, drives shown as devices	Everything is treated as a file (even devices)	Similar to Linux; uses /dev, UI presents them as devices
User Account Types	Four: Administrator, Standard, Child, Guest ➤ Administrator has full privileges	Can create any type of user with custom privileges ➤ Root user has full control	Admin, Standard, Guest ➤ Root is hidden by default
File Name Restrictions	Cannot have two files with same name in same folder	Same restriction applies	Same restriction applies
Default Home Directory	My Documents inside C:\Users	/home/username	/Users/username
Path Separator	Uses Backward slash (\)	Uses Forward slash (/)	Uses Forward slash (/)
Developer	Microsoft	Canonical Ltd. + Open Source Community	Apple Inc.
Kernel Type	Hybrid (Windows NT)	Monolithic (Linux Kernel 6.x)	Hybrid (XNU = Mach + BSD)
File System	NTFS, ReFS	ext4, btrfs, XFS	APFS

<b>Process Mgmt</b>	Priority-based, Preemptive	Fork-Exec Model, Systemd	Grand Central Dispatch (GCD)
<b>Memory Mgmt</b>	Virtual Memory, Paging, Compression	Demand Paging, Swap, Memory Maps	Memory Compression, Paging
<b>Security</b>	TPM, BitLocker, Windows Defender	AppArmor, SELinux (Fedora), Sudo	SIP, Gatekeeper, FileVault
<b>Package Manager</b>	MSI, Winget, Microsoft Store	APT, Snap, Flatpak	App Store, Homebrew
<b>GUI/UX</b>	Fluent Design, Start Menu, Snap Layouts	GNOME (Ubuntu), KDE, XFCE	Aqua UI, Stage Manager
<b>Community</b>	Medium (via Insider Program)	Very High (Forums, GitHub, Maintainers)	Low (Apple Developer Program)
<b>Customization</b>	Low	Very High	Low
<b>Use Cases</b>	Home, Enterprise, Gaming	Servers, Developers, Students	Creatives, Professionals, Apple Ecosystem

Conclusion from the [https://en.wikipedia.org/wiki/Usage\\_share\\_of\\_operating\\_systems](https://en.wikipedia.org/wiki/Usage_share_of_operating_systems) & <https://gs.statcounter.com/os-market-share#monthly-202502-202502-bar>

#### Usage share of operating systems:

1. **Windows dominates the desktop OS market with the largest share worldwide, maintaining a strong presence especially in personal computers and enterprise environments.**
2. **macOS holds a significant but smaller portion of the desktop market, primarily favored by creative professionals and users within the Apple ecosystem.**

3. **Linux-based operating systems have a relatively small desktop market share but are widely used in servers, cloud infrastructure, and specialized applications due to their flexibility and open-source nature.**
4. **In the mobile OS market, Android leads overwhelmingly, thanks to its wide adoption by many manufacturers, while iOS maintains a loyal user base with premium devices.**
5. The usage share of operating systems varies significantly by device type—desktop, mobile, server, and embedded systems—reflecting differing user needs and ecosystem preferences.
6. Market trends show a gradual shift towards mobile and cloud-based computing, influencing the overall OS landscape and the importance of mobile operating systems.

References:

- [https://www.youtube.com/watch?v=B7t\\_BCmY-Ig](https://www.youtube.com/watch?v=B7t_BCmY-Ig)
- <https://www.linkedin.com/pulse/comparative-case-study-windows-mac-linuxunix-operating-bazigu-alex-urezf/>
- <https://www.youtube.com/watch?v=PWOUKnwFHM>
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