

Introduction to Mobile Operating Systems

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(A concise, easy-to-read guide)

1. What Is a Mobile Operating System (OS)?

Aspect	Description
Definition	Software layer that manages hardware resources (CPU, memory, sensors, radios) and provides services for applications on smartphones, tablets, wearables, and other handheld devices.
Core Functions	- Process & thread scheduling - Memory management - Power management - Device driver abstraction - Security & permission enforcement - UI rendering & input handling
Why It Matters	Determines performance, battery life, app ecosystem, security model, and user experience.

2. Major Mobile OS Families (2024)

OS	Primary Vendor	Open? source?	Market Share (approx.)	Key Characteristics
Android	Google	Yes (AOSP)	~71% (global)	Highly customizable, vast hardware support, Google Play services, strong multitasking.
iOS	Apple	No (closed)	~28% (global)	Tight hardware-software integration, uniform UI, strong privacy controls, App Store-centric distribution.
HarmonyOS	Huawei	Partially open	Emerging (mainly Chinese market)	Distributed architecture, cross-device integration, microkernel for security.

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OS	Primary Vendor	Open? source?	Market Share (approx.)	Key Characteristics
KaiOS	KaiOS Technologies	Yes (based on Firefox OS)	Niche (feature phones)	Light footprint, supports 4G, SMS, basic apps (WhatsApp, Google Maps).
Other / Specialized	•	•	•	• Tizen (Samsung wearables & TVs), • watchOS (Apple Watch), • Wear OS (Google), • Fuchsia (experimental).

3. Architecture Layers

Application Layer (Apps, UI, Services)
Framework / API Layer (Java/Kotlin, Swift, C/C++, WebView, native libs)
Runtime Environment (ART/Dalvik, JavaScript, .NET, native runtime)
Linux Kernel (or microkernel in some OS)
Hardware Abstraction Layer (HAL)
Device Drivers & Firmware

- **Android** – Linux kernel ? HAL ? Android Runtime (ART) ? Framework ? Apps.
- **iOS** – XNU kernel (Mach + BSD) ? I/O Kit ? Core OS ? Cocoa Touch ? Apps.

4. Key Concepts & Services

Concept	Android	iOS
Package Management	APK files, Google Play Store, side? loading allowed.	.ipa files, App Store (strict review).

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Concept	Android	iOS
Security Model	Sandbox per app, SELinux policies, runtime permissions.	App sandbox, entitlements, mandatory code signing.
Power Management	Doze mode, App Standby, adaptive battery.	Background task limits, Low Power Mode, power assertions.
Update Mechanism	OTA updates via Google/ OEM, Project Treble separates vendor code.	OTA updates controlled by Apple, simultaneous rollout.
Multitasking	Pre?emptive multitasking, split?screen (API 24+).	Pre?emptive multitasking, Slide Over