Layered Architecture of Harmony OS and Its Performance and Security

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Group ID : Reg_Grp_84

System : Harmony OS

Architecture : Layered architecture

Key Qualities: Performance & Security

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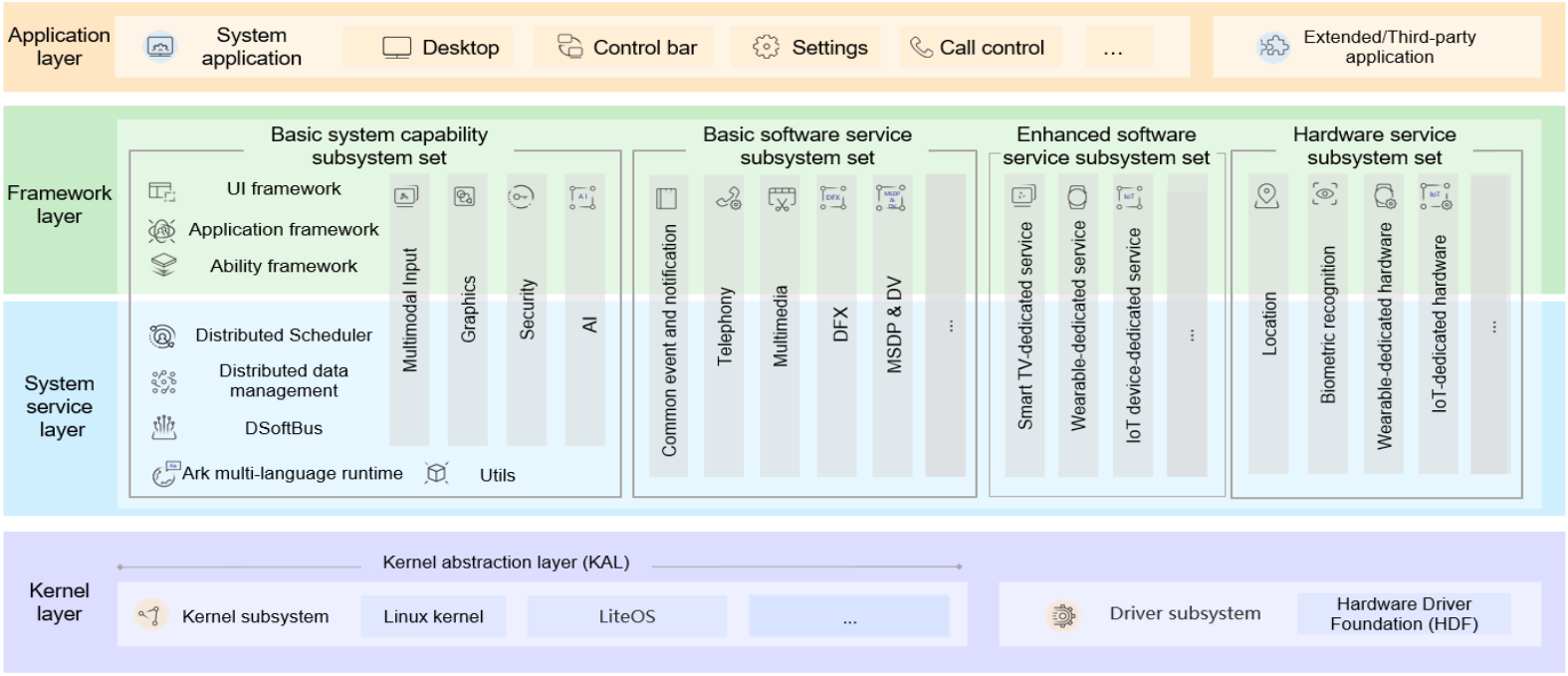
HARMONY OS



HARMONY OS ARCHITECTURE

LAYERED ARCHITECTURE OF HARMONY OS

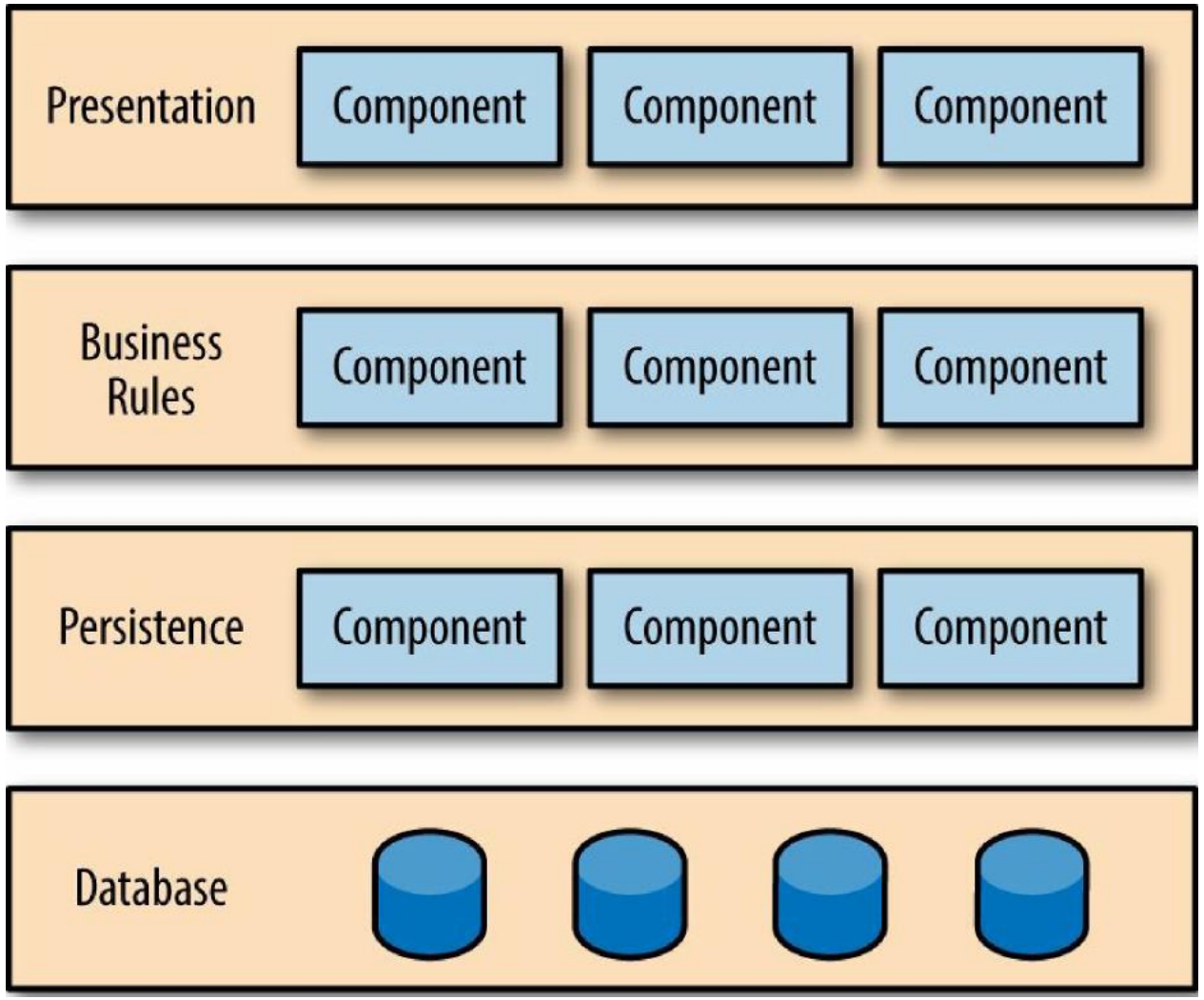
Kernel Layer - The kernel abstraction layer (KAL) shields differences in kernel implementations and provides the upper layer with basic kernel capabilities, including process and thread management, memory management, file system, network management, and peripheral management

System Service Layer - This layer provides a complete set of capabilities essential for HarmonyOS to offer services for applications through the framework layer

Framework Layer - This layer provides what you need to develop Harmony OS applications

Application Layer - This layer consists of system applications and third-party applications

HISTORY OF THE LAYERED ARCHITECTURE



EVOLUTION OF LAYERED ARCHITECTURE

- Main frame / legacy systems
- Single Tier Architecture
- Two Tier Architecture
- Three Tier Architecture
- N Tier Architecture

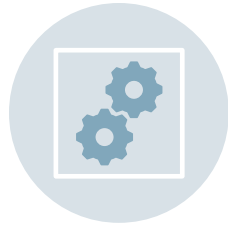
WHY TO USE LAYERED ARCHITECTURE?

ALLOWS US TO THINK IN CONCERNS

EASIER TO UNDERSTAND AND WRITE CODE

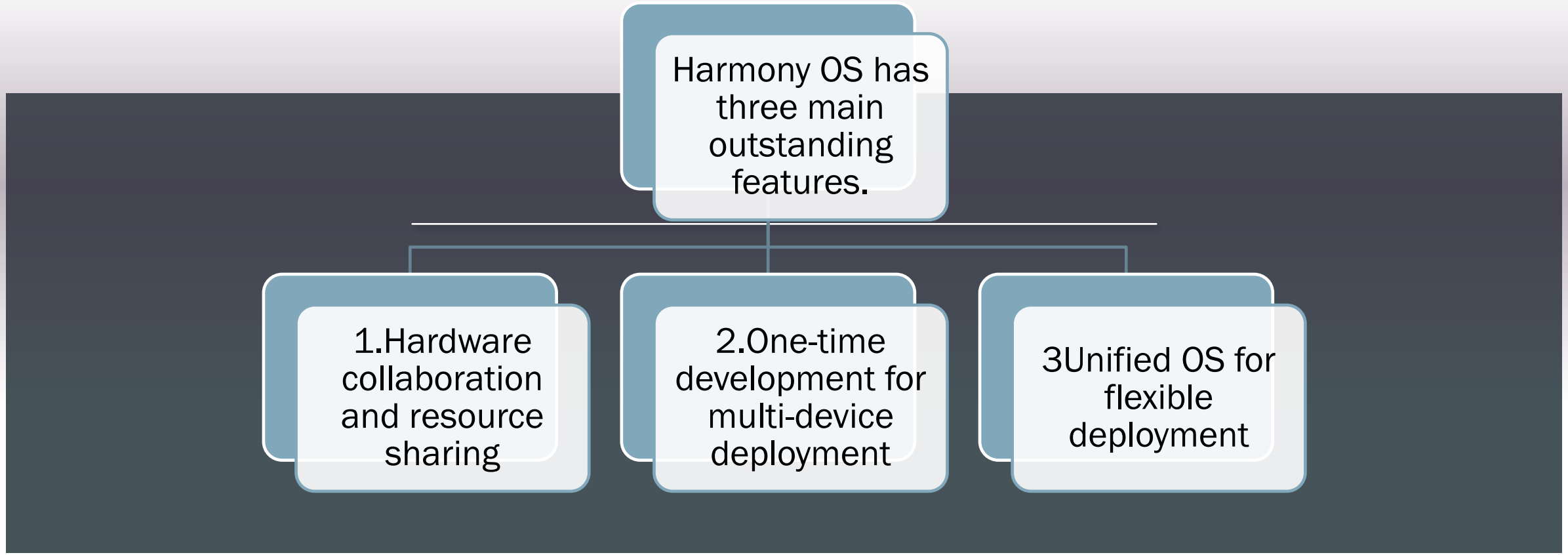
EASIER TO EXTEND

LAYERING HELPS TO DIFFERENTIATE BETWEEN THE TASKS ASSIGNED TO EACH LAYER OF THE ARCHITECTURE



DATA TRANSFER IS CONSISTENT AND MADE AVAILABLE ALWAYS IN THE LAYERS

PERFORMANCE OF HARMONY OS



HARDWARE COLLABORATION AND RESOURCE SHARING

- DSoftBus: a communication base for interconnecting devices.
- Distributed device virtualization: enables cross-device resource convergence, device management and data processing.
- Distributed data management: leverages DSoftBus to manage application data and user data distributed on different devices.
- Distributed scheduler: builds a unified distributed service management mechanism

One time development for Multi-device deployment

- Harmony OS provides the application, ability and UI frameworks, which allow you to reuse service and UI logic during application development.

Unified OS for flexible deployment

- Harmony OS leverages component-based and miniaturized oriented designs to allow on-demand deployment for diversified devices adapting to different hardware resources and business characteristics.

OTHER FEATURES THAT IMPROVES THE PERFORMANCE

App guard : The apps on AppGallery are verified as safe, having passed rigorous security checks.

Super device : Super Device makes it easier than ever to transfer tasks and share data between devices.

Smart Listening : Touch the audio control panel section to transfer your music to a new audio device.

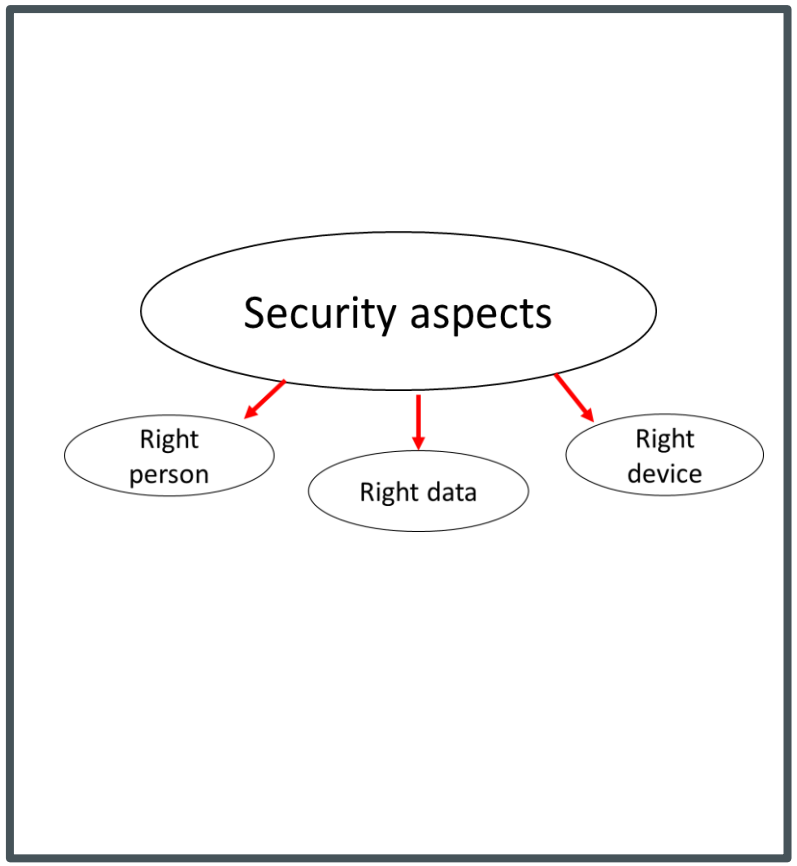
Control panel : Control panel takes you to the most commonly used settings allowing you to manage media audio, shortcut switches and paired devices with greater ease.

Service center : Service center get direct access to many new information that has been waiting for you.

Celia suggestions : Celia suggestions is a homescreen app that recommends services that are likely to pique your interest, based on your usage habits.

Large folders : Design the easy to navigate homescreen by categorizing apps.

SECURITY OF HARMONY OS



- Ensures that Right person uses the Right data through the Right device

Right Person

Right person = authenticated user

Ways used to implement identity authentication

- Zero-trust model
- Multi-factor authentication
- Collaborative authentication

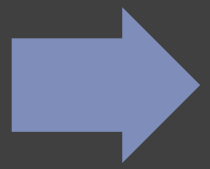
Right Device

To safeguard effective user data security on virtual devices

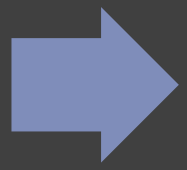
Ways used to ensure security on a virtual devices

- Secure Boot
- TEE
- Device Certification

Right Data



Ensures personal data, privacy, and confidential data are protected against disclose



Ways used to ensure Data protection

- Data Generation
- Data Storage
- Data usage
- Data Transmission and Destruction

COMPARISON BETWEEN HARMONY OS AND OTHER MOBILE OPERATING SYSTEMS

- Harmony OS is way more advanced than Android in terms of growth area and development ecosystems.
- Some basic differences are listed below

HarmonyOS vs Android

Basis ↓	HarmonyOS	Android
Kernel	Developed entirely on micro-kernel software.	Built using Linux kernel at its core.
Hardware Platform	Can be mounted on IoT devices along with smartphones and smart devices.	The only platform Android supports is mobile phones.
Engine	Built with a deterministic latency engine.	Deployed with Linux IPC mechanism.
Root Access	Does not support root access.	Supports root access.

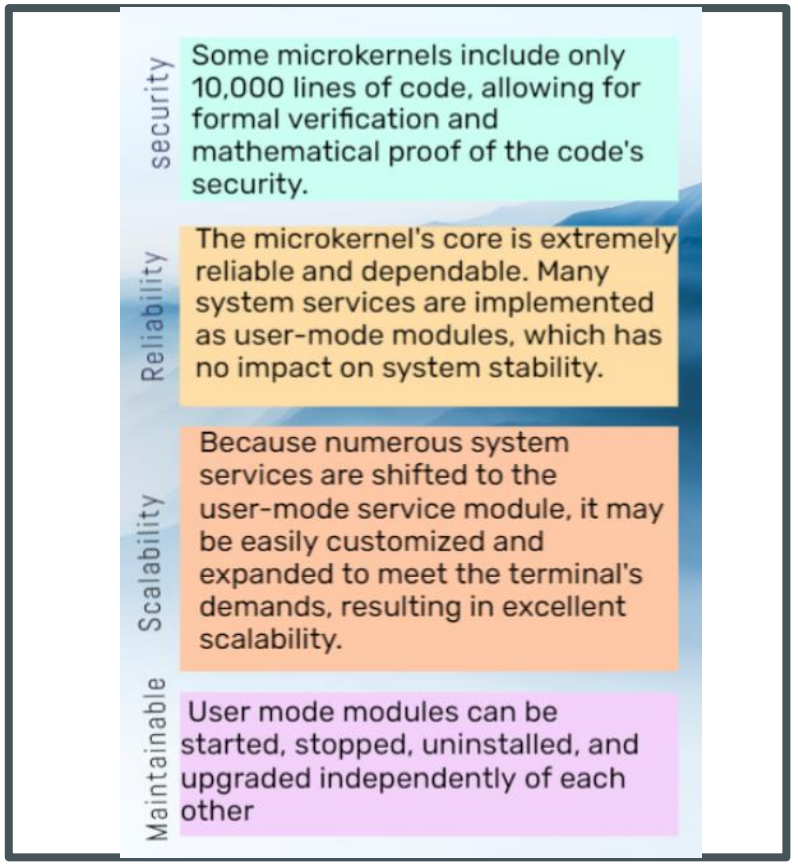
LINUX KERNEL VS MICROKERNEL

Harmony OS has about 1/1000 amount of code present in the linux kernel

It facilitates the process of creating and debugging drivers

Moreover, to great portability between different types of devices and faster communication. compared to android OS microkernel brings many new advantages like

High Security	High reliability	High Scalability	High Maintainability



ROOT VS NO ROOT

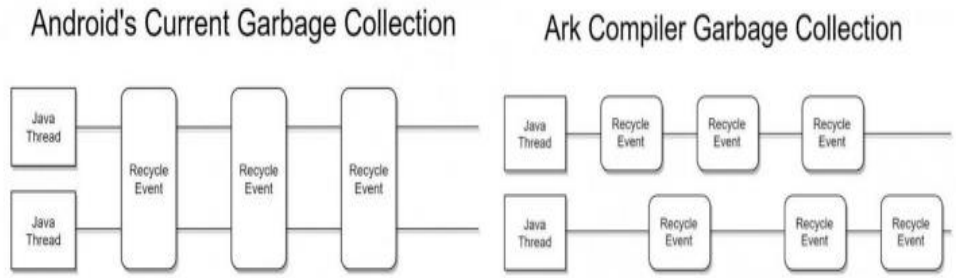
Many people like Android because it is so simple to use.

After all, few operating systems are as easily customizable as Android, thanks to features like root access and the ability to install third-party ROMs that totally alter the user experience.

In Harmony OS, though, things will be completely different. Huawei has verified that performing, obtaining root permissions, or anything similar will not be feasible in its operating system, claiming that this type of technique jeopardizes the platform's security.

ANDROID VS ARK COMPILERS

- Java is used to write the vast majority of existing Android apps.
- For the CPU to understand the instructions a Virtual Machine(VM) is needed in android which will cause the program to run slowly or even freeze
- The biggest advantage of the Huawei compiler is that it bypasses the VM
- To some extent, the Ark compiler advances the compilation process to the application development stage, thereby it greatly reduces the operating burden on smartphones and operating systems.



Seamless Experience	Android and iOS development tools force developers to rely on the underlying technology.	HarmonyOS, on the other hand, uses distributed channels
Enhanced Performance	Huawei managed to make the OS as lightweight as possible so that the operating system can work properly on devices of different types	The application processing time has been lowered by 25.7% and has increased IPC performance by up to 5x the existing systems.
Multifunctionality	Android, Windows, and Apple focus on specific devices and are limited to a single platform	Harmony OS works across multiple devices and promotes multi-language unification

Improved Security

mostly Android in now responsible for 100% of all active malware, around the world

Harmony OS is a cut above all the factors which is what makes it a preferable choice

Speed

"Deterministic Latency Engine, "mechanism evaluates the characteristics of each application in real-time in order to allocate system resources as efficiently as possible.

Harmony OS is a cut above all the factors which is what makes it a preferable choice

RAM Efficiency

IOS is the most efficient. Harmony OS is medium, and android is the worst.

Cross Device Design

Harmony OS is a cross-device design that includes everything from basic to distributed design interactives

THANK YOU!