Empowering a Connected, Intelligent World With OpenHarmony

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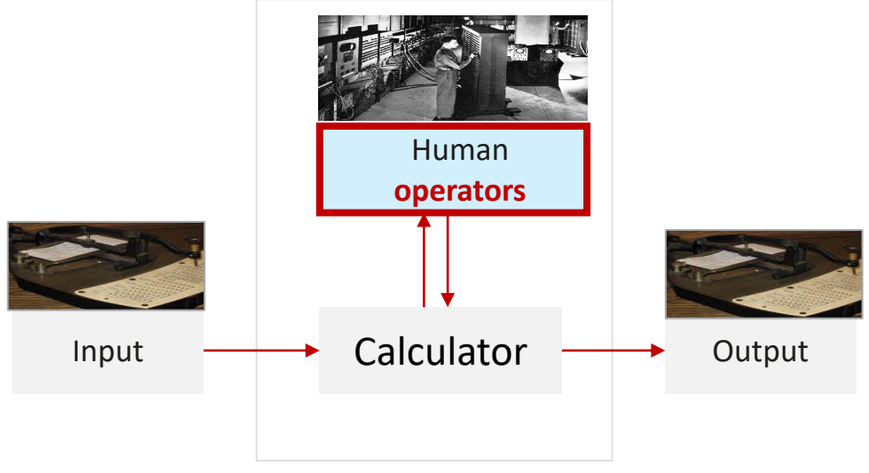
Continuously Evolving Operating Systems

From Human Operators to Operating Systems - The 1956 Milestone

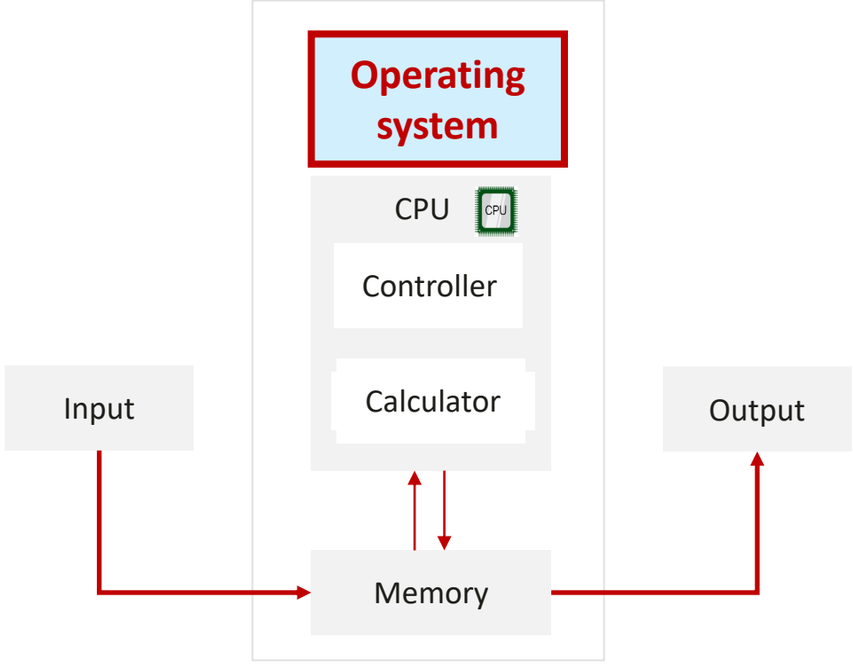
1946–1955

Early computers operated without operating systems.



A single-tasking calculating machine
(Poor usability)

1956–now



A multi-tasking and user-friendly computer

Connected, Intelligent World: Calls for New Operating Systems

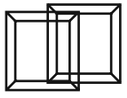
Replacement for manually punched cards

Batch processing

1956

First operating system
GM-NAA I/O

Multi-tasking
Improved performance



Host

1960s

- OS/360 (1964)
- UNIX (1969)

Keyboard and mouse based UI
Emergence of the software industry

PC internet

1980s

- **Windows (1985)**
- **Linux (1991)**

Touch-based UI
Portal of ecosystem

Mobile internet

2000s

- **iOS (2007)**
- **Android (2008)**

Empowering versatile industries with intelligence

Connected, intelligent world

2020s

- ?

What is a Connected, Intelligent World?

Healthcare
Making Health Computable, Bettering Quality of Life

Food
Data-driven Food Production for More Bountiful, Inclusive, and "Green" Diets

Cities
New Digital Infrastructure Makes Cities More Human and Livable

Energy
Intelligent, Green Energy for a Better Planet

Living Spaces
Personalized Spaces with Novel Interactive Experiences

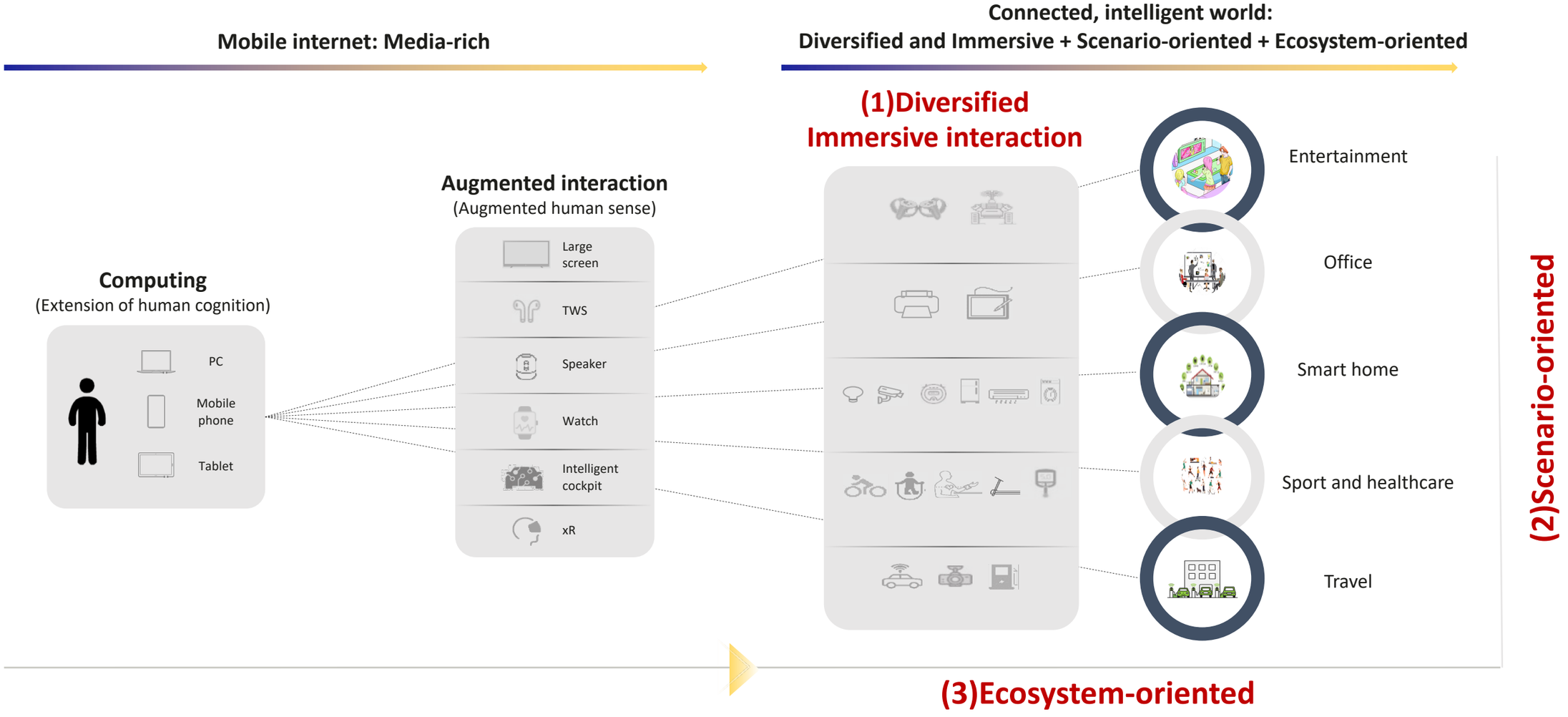
Transportation
Smart, Low-carbon Transport Opens up the Mobile Third Space

Enterprises
New Productivity, New Production Models, New Level of Resilience

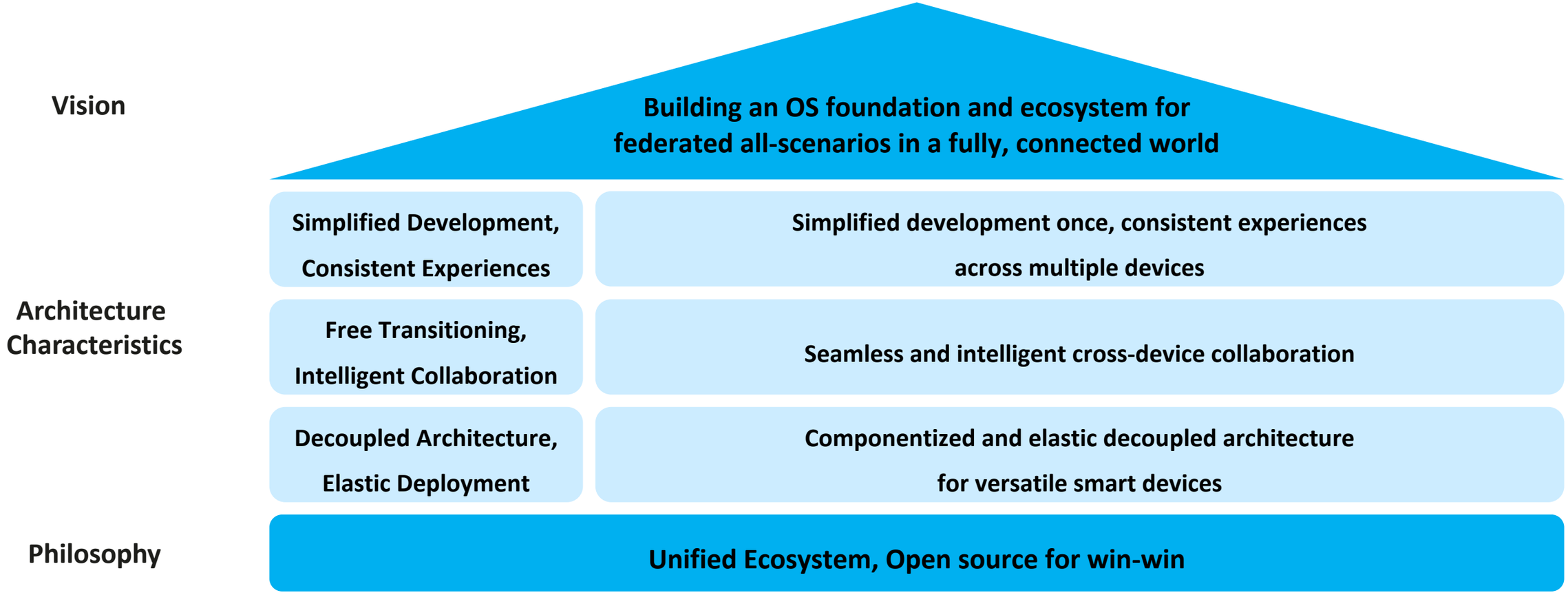
Digital trustworthiness
Digital Trust

# of connections worldwide	General-purpose computing power (FP32)	AI computing power (FP16)	Cloud services as % of total enterprise application expenditure	Share of renewable energy in global electricity generation
200 bn	**3.3 ZFLOPS, 10x ⬆**	**105 ZFLOPS, 500x ⬆**	**87%**	**50%**

Three Major Changes in a Connected, Intelligent World



OpenHarmony: Vision, Design Philosophy and Architecture Characteristics



Empowering a Connected, Intelligent World with OpenHarmony: Three Tracks

Unified ecosystem for apps and services

HarmonyOS

Ultimate experience with software-hardware-chip-cloud integration to support Huawei's high-quality products.

HUAWEI

Third-party commercial releases & products

Empower a range of industries.

Open Source Community & Third-party

OpenHarmony

OpenHarmony

Advanced OS base for a connected, intelligent world

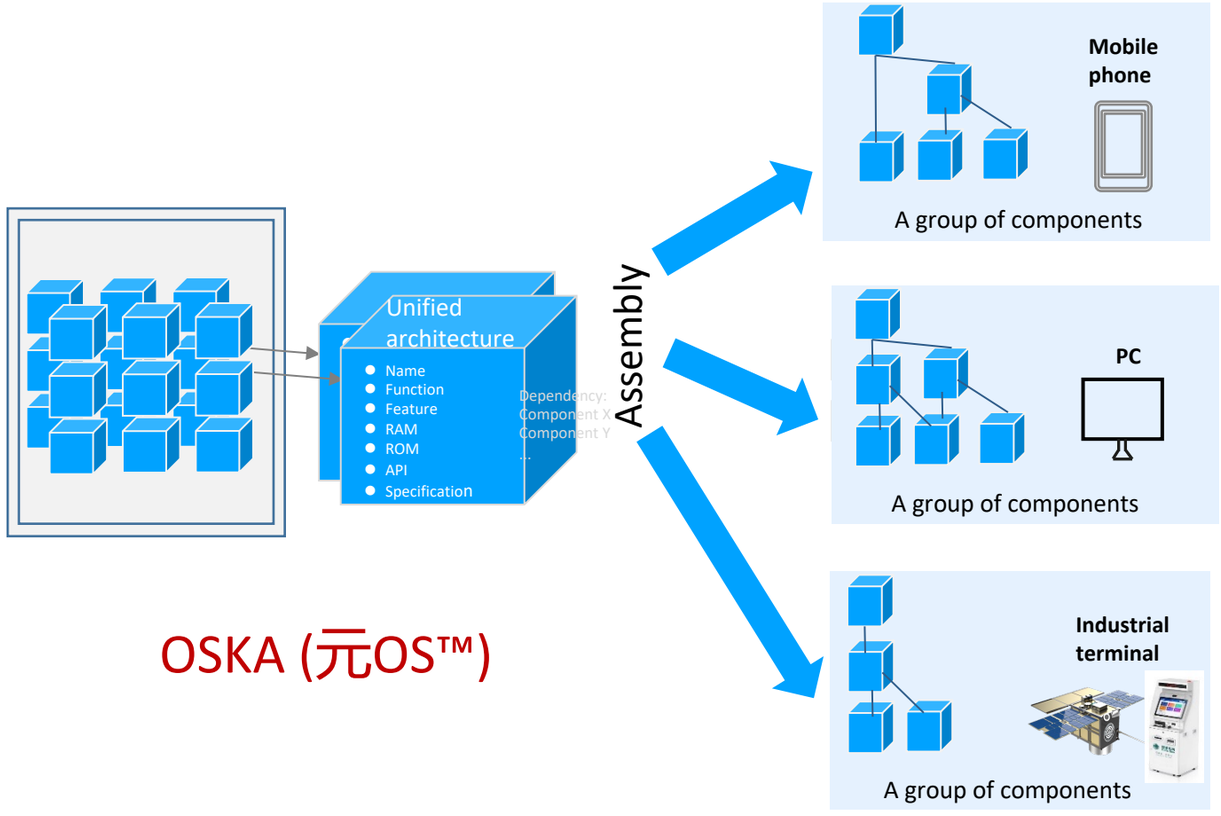
Empowering a Connected, Intelligent World

One OS Kit for All | Superb Performance | AI Native | Secure By Design

Empowering a Connected, Intelligent World

One OS Kit for All | Superb Performance | AI Native | Secure By Design

One OS Kit for All: Serving a Broad Spectrum of Devices



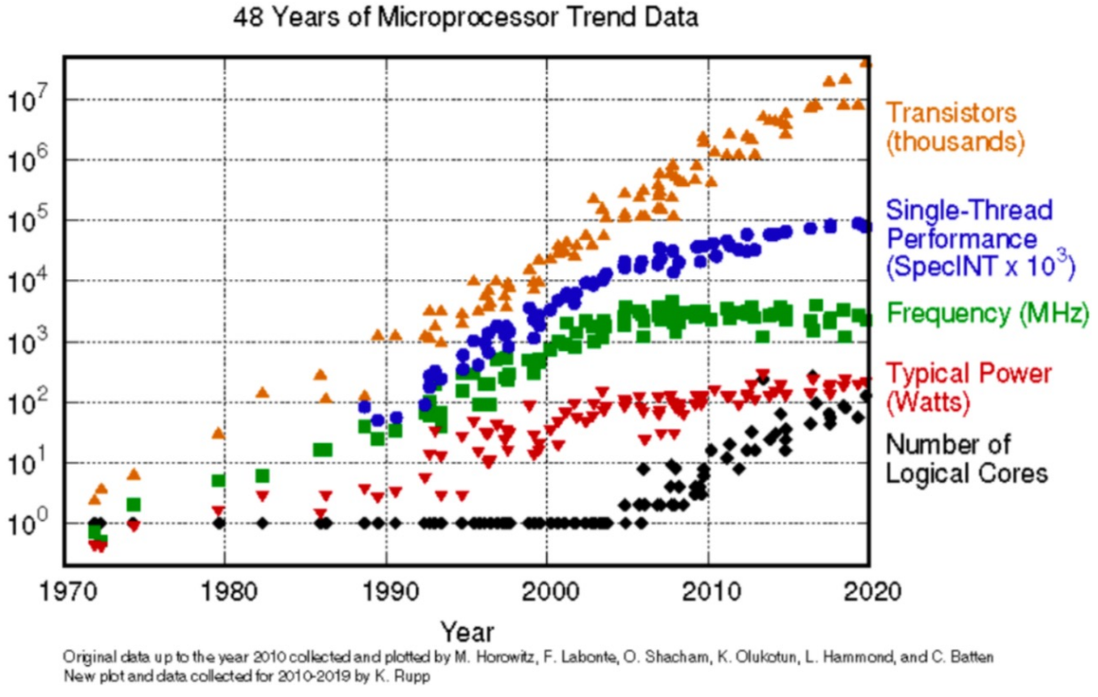
OSKA (元OS™)

1. **Unified architecture across different devices**
   - Fast time to market
   - Low R&D costs
2. **All-scenario collaboration and intelligence**
   - Cross-device cooperation
   - Transparent task offloading
3. **Open and unified ecosystem**
   - Write once, run everywhere

Empowering a Connected, Intelligent World

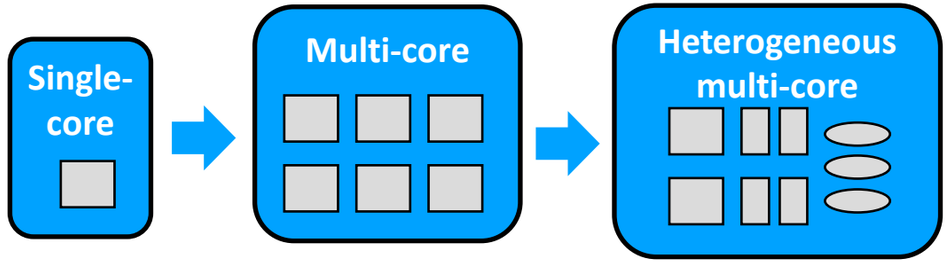
One OS Kit for All | **Superb Performance** | AI Native | Secure By Design

The Trend Towards Heterogeneous, Multi-core Devices



- End of Dennard scaling law
- Moore's law is slowing down

Evolving Hardware

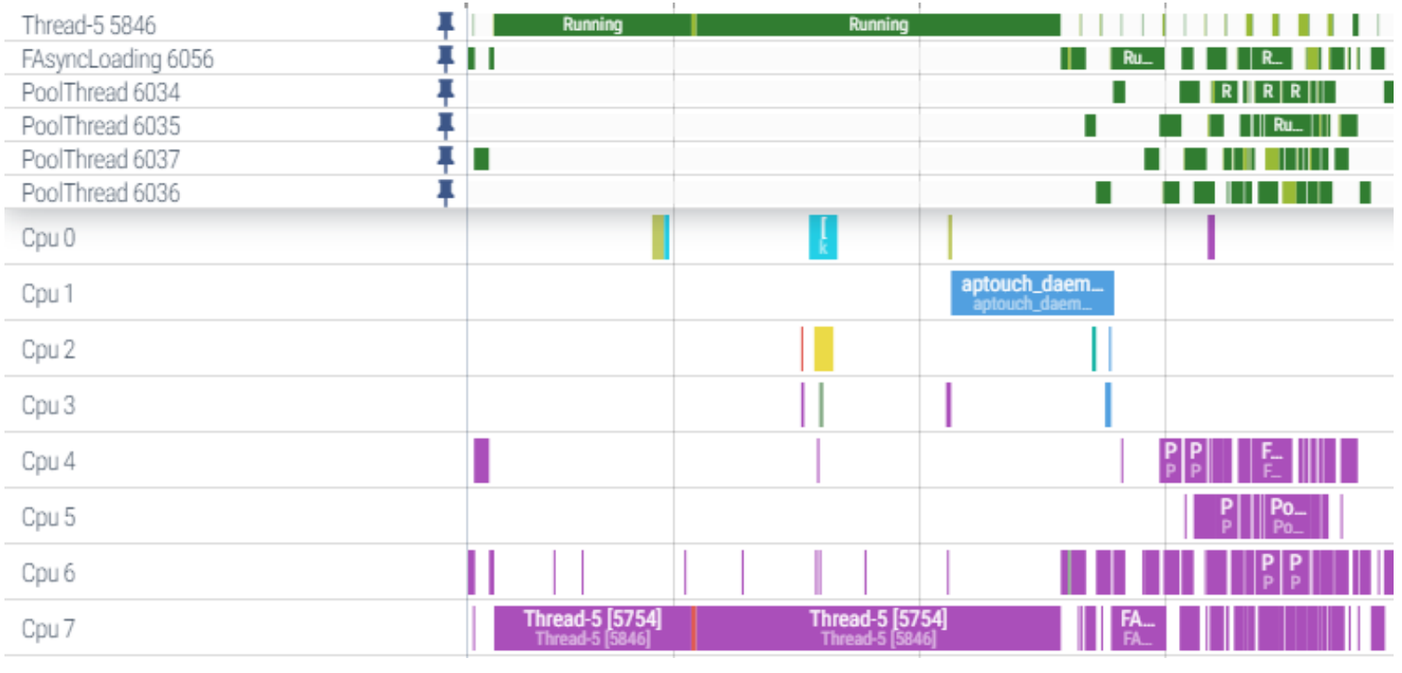


From **Single-core** to **Multi-core**

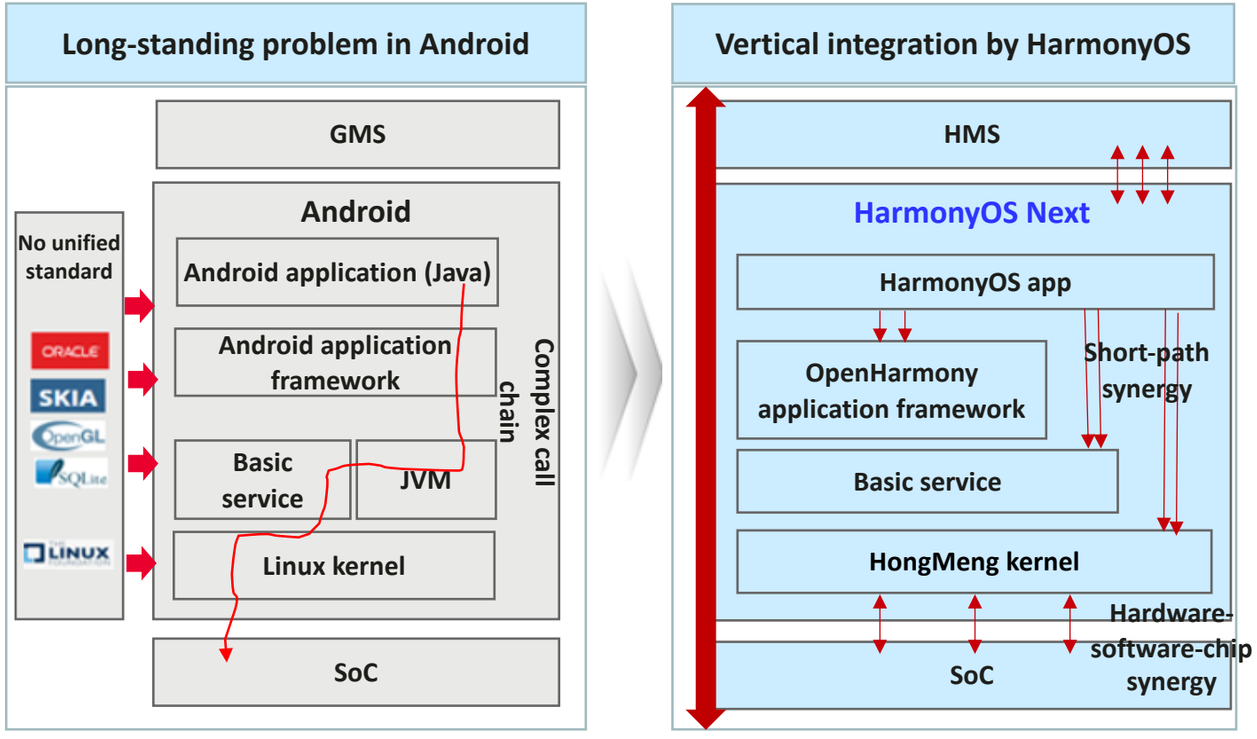
From **Homogenous** to **Heterogeneous**

Operating System: Key to Maximize Efficiency of Heterogeneous, Multi-core Devices

source:https://www.sgss8.net/tpdq/2517458/



Design philosophy: Vertical-integration Leads to High Performance



Issues with Android

- + Flexible architecture for versatile devices and apps
- - Apps are **far away** from hardware
  - No unified standard, extremely long call chain
- **- Huge semantic gap**

Vertical-integration architecture of OpenHarmony

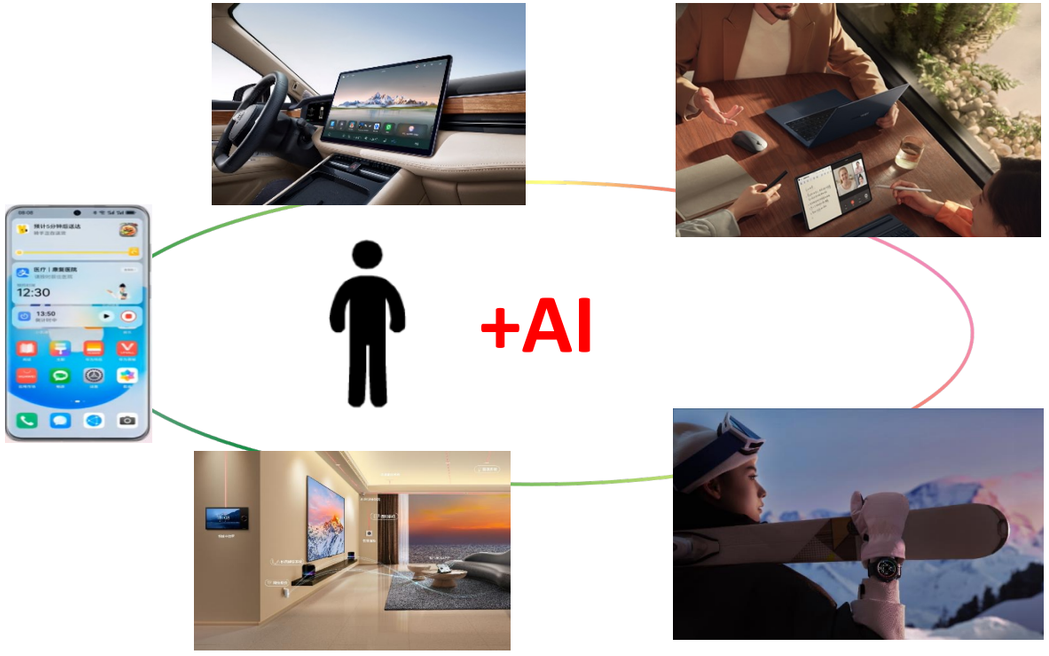
- Software-hardware-chip-cloud coordination for **short-path synergy**
- **Unleash the potentials** of hardware
- **Bridge the semantic gap**
- Reduce the upper-layer service load

Empowering a Connected, Intelligent World

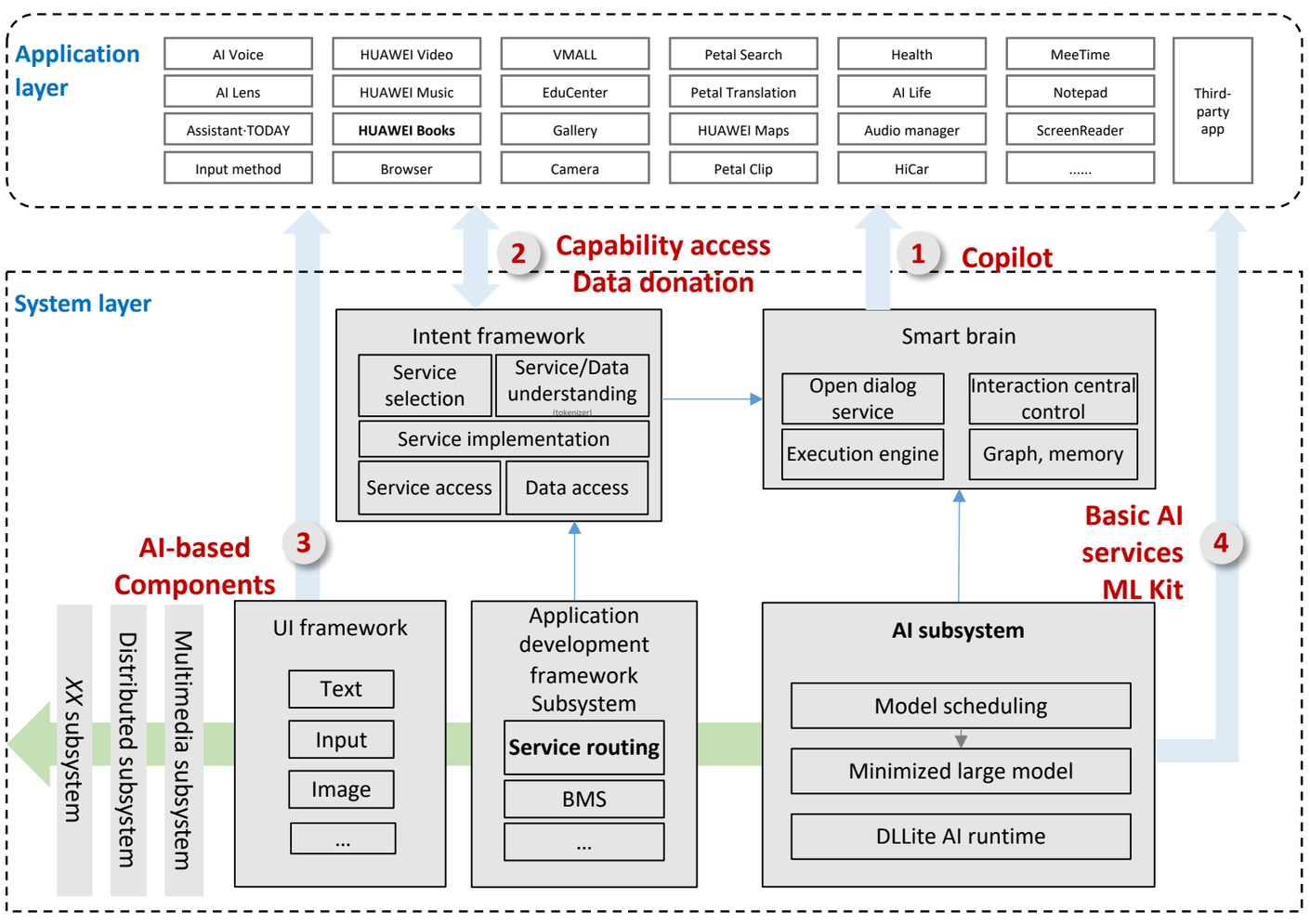
One OS Kit for All | Superb Performance | **AI Native** | Secure By Design

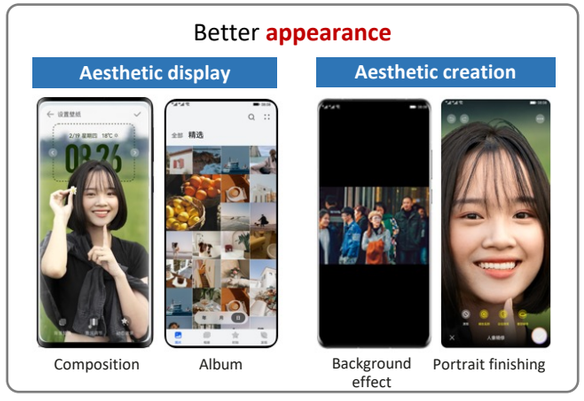
From "Smartphone" to "AI phone"

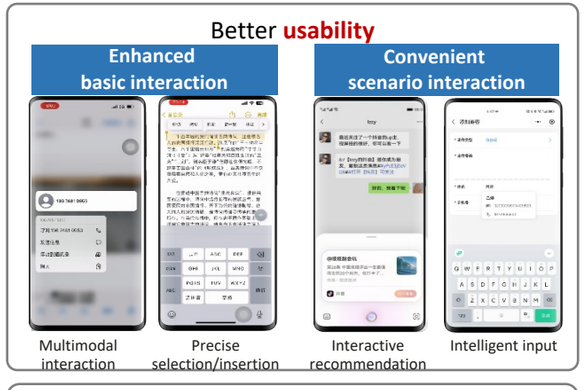
- Feature phone: phone calls and sent SMS messages.
- Smartphone: easy information access, rich media and efficient communication
- **AI phone:** multi-facet copilots, immersive interaction, and smarter software stack

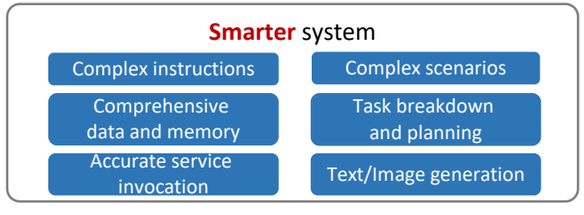


AI for OS: Apps Benefiting from AI-native Design with Four Modes

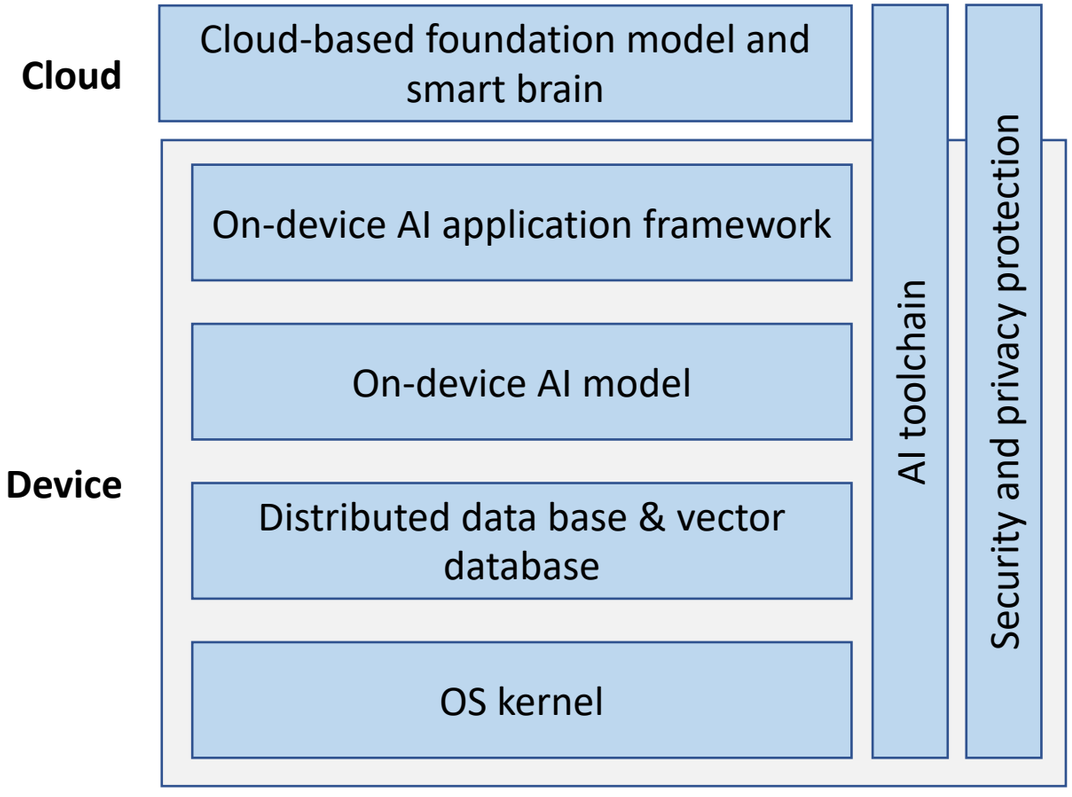








OS for AI: Native Software Architecture and Toolchain for AI



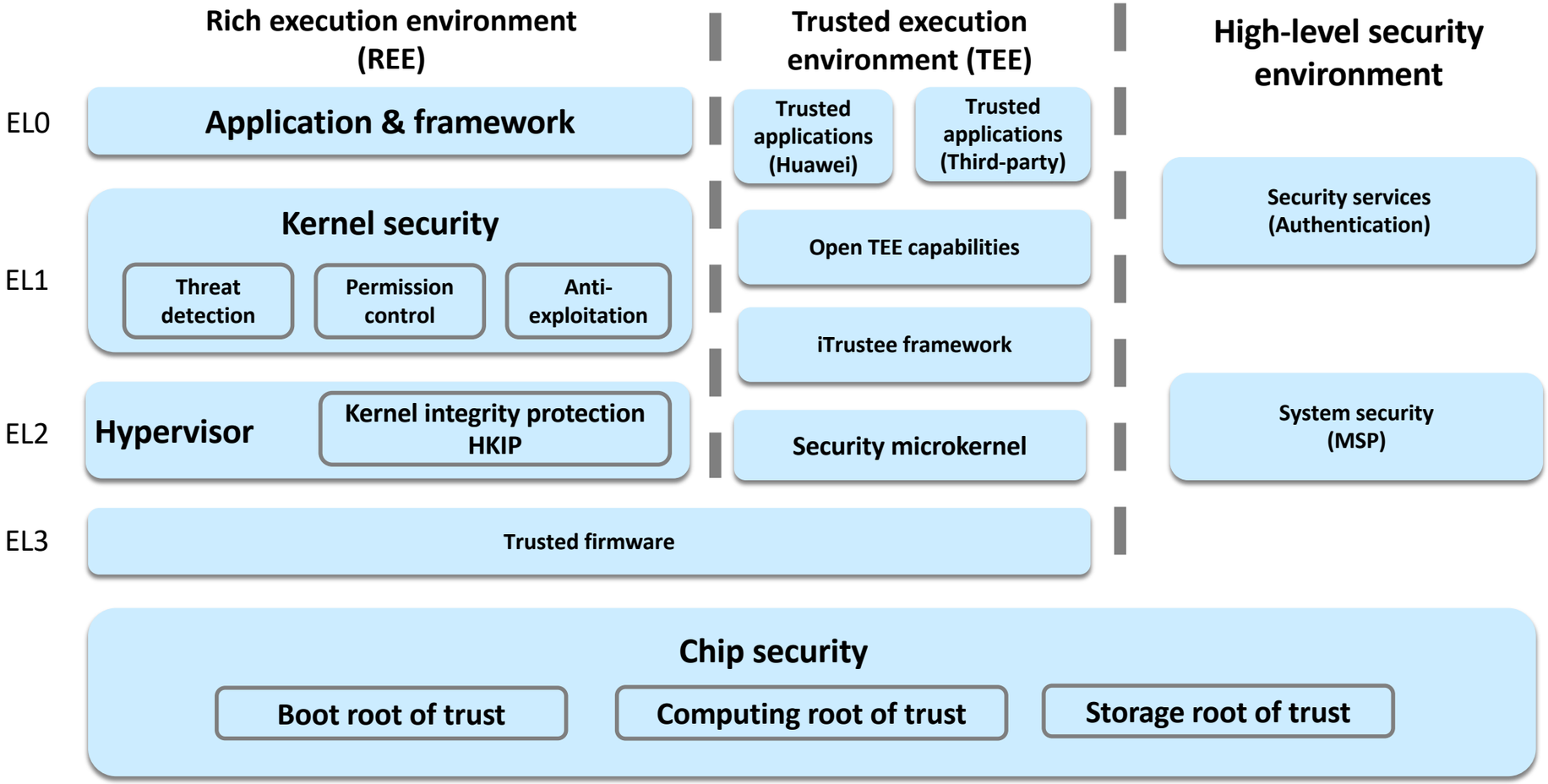
- Goal: make on-device intelligence easy to use, good to use, and secure to use.

- Approach:
  - A **resource provisioning mechanism that fits AI load** characteristics.
  - A **user-centric all-scenario and vectorized data base**.
  - A device-cloud synergy AI model, toolchain, and **security & privacy protection** mechanism.

Empowering a Connected, Intelligent World

One OS Kit for All | Superb Performance | AI Native | **Secure By Design**

Security Architecture with Multi-level Compartmentalization



Enhanced Security Base

Hierarchical security of connected devices, device-device complementation, and device-cloud synergy

Updates of OpenHarmony’s Business and Ecosystem

OpenHarmony: Fastest-Growing Open-Source OS Community for Smart Devices

No.1

Gitee index

100+ million

Code lines

350+

Software and hardware products

54+

Adapted chips

(in and outside China)

51

Partners

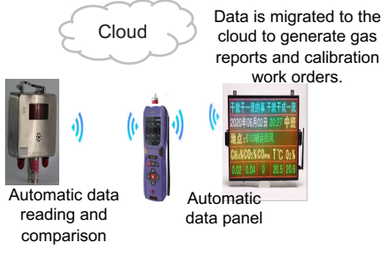
5897+

Community contributors

350+ Software and Hardware Products Across Key Sectors

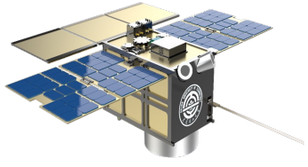
Energy

Mining and electric power terminals



Aerospace

Satellites



Industry

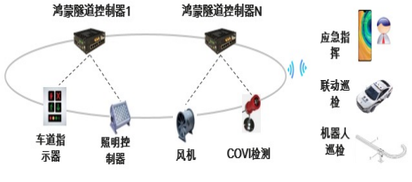
Drones and industrial terminals

Finance

Financial terminals

Transportation

Smart tunnels



Healthcare

Smart medicine cabinets

Education

Harmony classroom

Government

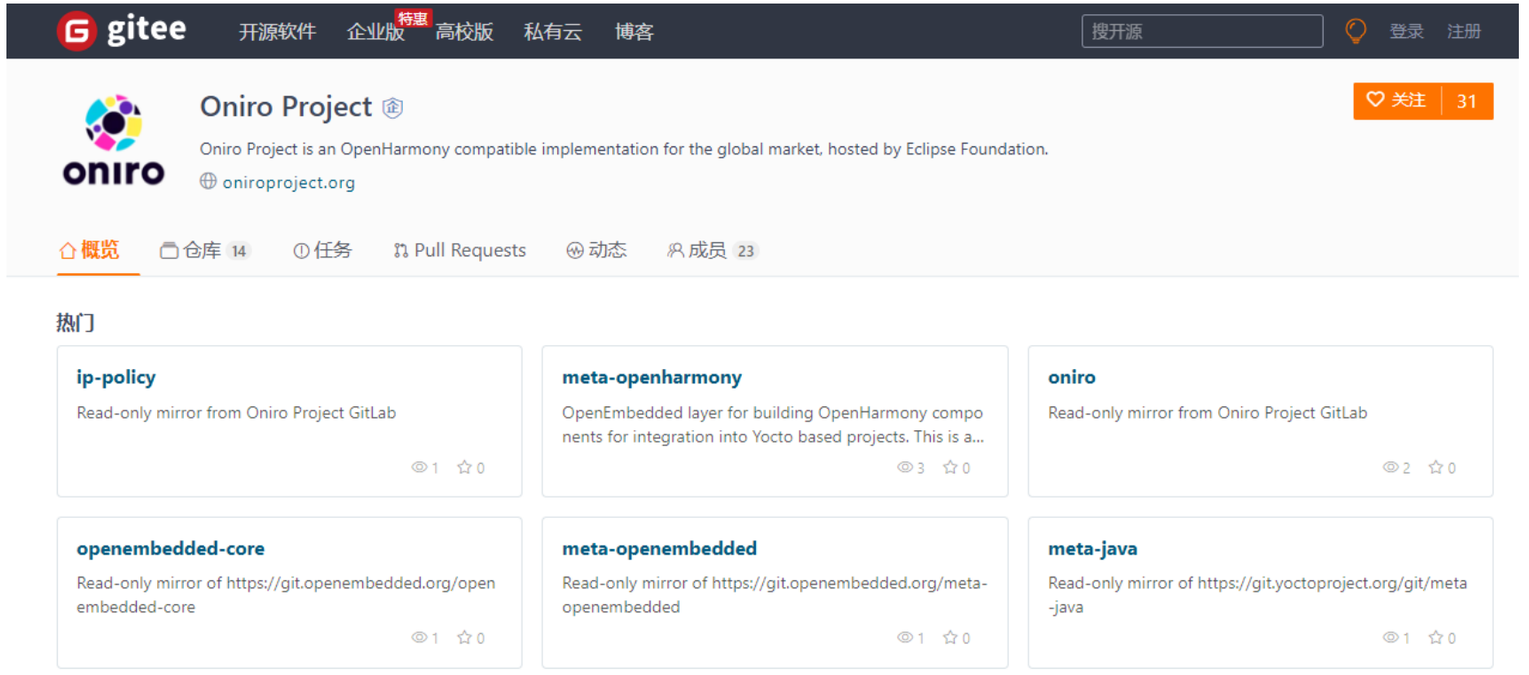
e-Government terminals

OpenHarmony Goes Global — Eclipse Releases Oniro OS

Mike Milinkovic, Executive Director of Eclipse: "Oniro OS will provide a real community-driven open-source solution.

It is an open-source project based on OpenHarmony, an open-source distributed operating system.

This is the first time that three open-source organizations (Eclipse, OpenAtom Foundation, and Linaro) are collaborating on a technology.



10 Challenges Posed by Empowering a Connected, Intelligent World

Released on First OpenHarmony Tech Summit

Ultimate experience

1. New forms of user-centric and scenario-aware applications
2. Cross-device and natural interaction based on diverse operations
3. User- and load-aware OS resource allocation
4. Highly energy-efficient and simplified abstracted heterogeneous environment

Strong security

5. Full-lifecycle data leakage prevention and privacy protection
6. Full-stack collaborative OS vulnerability mitigation and defense
7. Distributed hierarchical security architecture oriented to Super Device

Easy development

8. Intelligent application development process and toolchain for all scenarios
9. One-time development for multi-device deployment across device, system, and platform
10. Unified driver framework with efficient development and distributed collaboration

Summary

- Evolving operating systems require new capabilities to enable a connected intelligent world.

- **OpenHarmony** is empowering a connected, intelligent world, building key capabilities:
  - One OS kit for all, superb performance, AI native, and secure by design.

- OpenHarmony has become the fastest-growing open-source smart device OS community.

- Still grand challenges ahead, open for joint efforts to address them together

Thank You!