Boost Arm Ecosystem with openEuler: Ushering in a Future of Digital Intelligence

Wei Xiong
Executive Director, OpenAtom openEuler Community
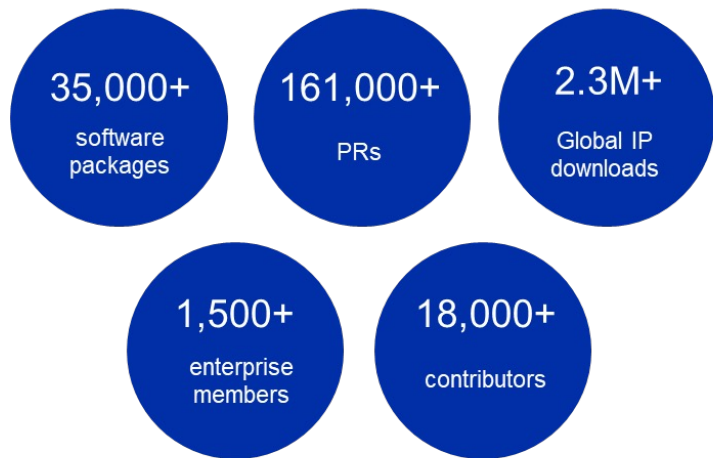
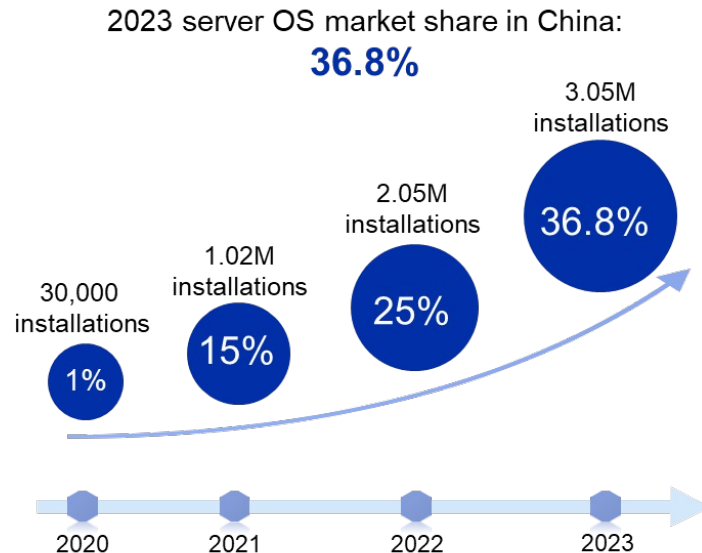# Where Is openEuler From?

openEuler is an open source project incubated and operated by the OpenAtom Foundation

openEuler: The biggest and fast-growing OS Platform communities

35,000+
software packages

161,000+
PRs

2.3M+
Global IP downloads

1,500+
enterprise members

18,000+
contributors

Scan to view more data

2023 server OS market share in China:
36.8%

30,000 installations

1%

1.02M installations

15%

2.05M installations

25%

3.05M installations

36.8%

2020   2021   2022   2023
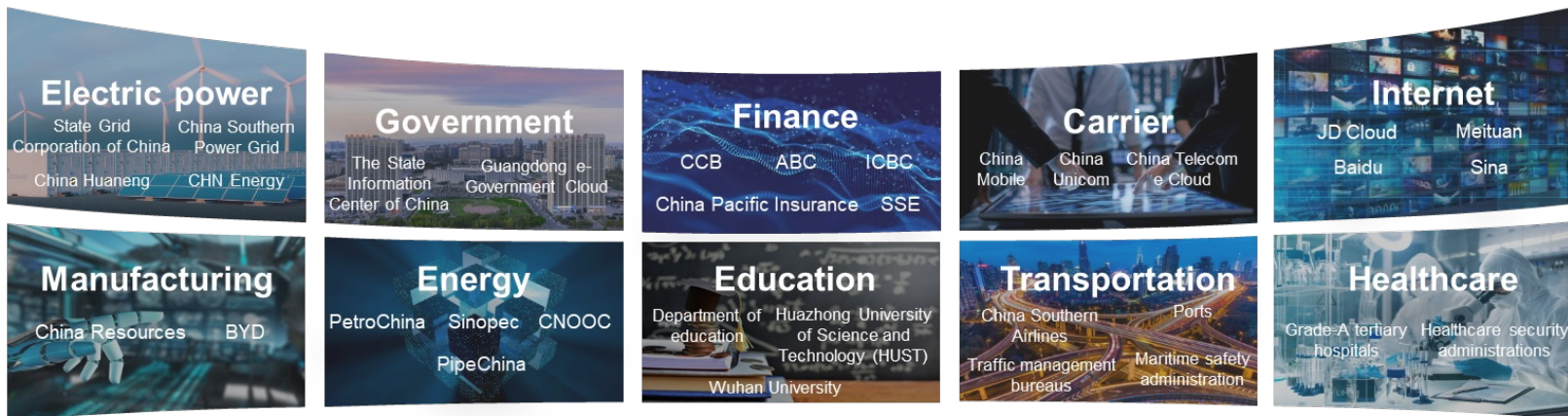
Source: *2023 China Server Operating System Market Research Report*, IDC

openEuler — the Preferred OS Solution for Industry Customers

Electric power
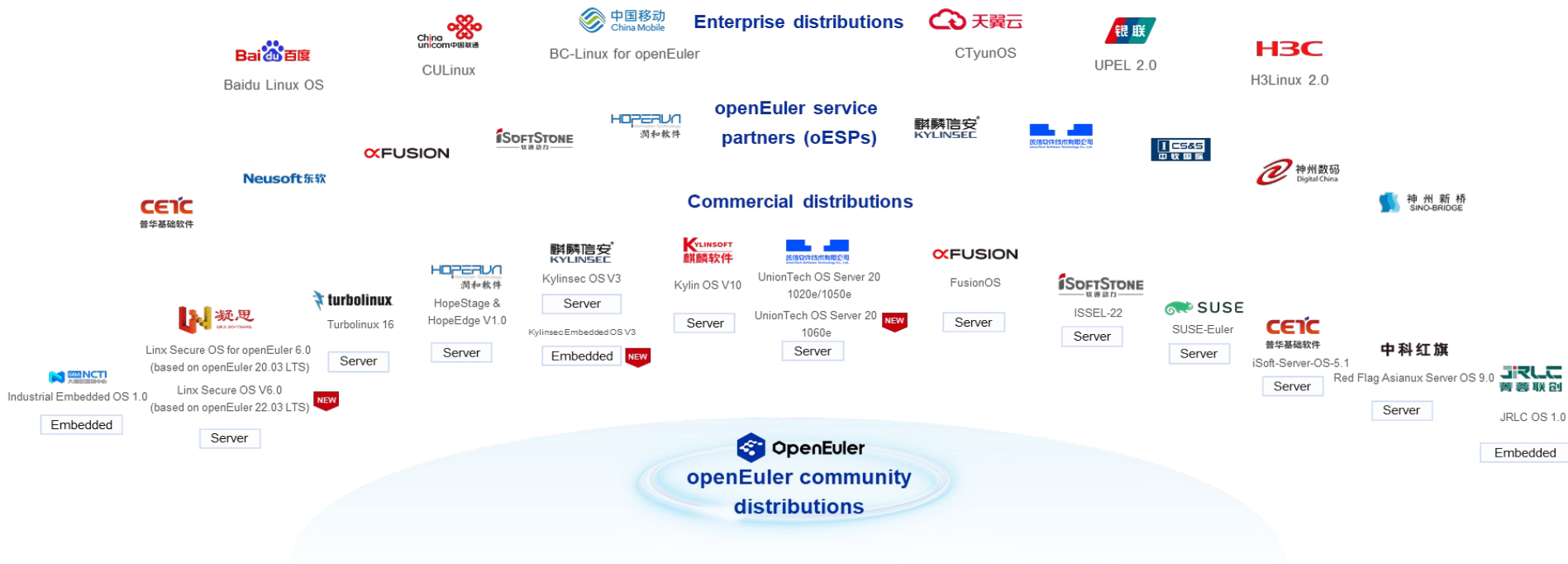- State Grid Corporation of China
- China Southern Power Grid
- China Huaneng
- CHN Energy

Government
- The State Information Center of China
- Guangdong e-Government Cloud

Finance
- CCB
- ABC
- ICBC
- China Pacific Insurance
- SSE

Carrier
- China Mobile
- China Unicom
- China Telecom e Cloud

Internet
- JD Cloud
- Meituan
- Baidu
- Sina

Manufacturing
- China Resources
- BYD

Energy
- PetroChina
- Sinopec
- CNOOC
- PipeChina

Education
- Department of education
- Huazhong University of Science and Technology (HUST)
- Wuhan University

Transportation
- China Southern Airlines
- Ports
- Traffic management bureaus
- Maritime safety administration

Healthcare
- Grade-A tertiary hospitals
- Healthcare security administrations

openEuler — Why So Fast And What We Have Done

Collaboration   Innovation

The Way Of openEuler Collaboration

Enterprise distributions

Baidu Linux OS

CULinux

BC-Linux for openEuler

CTyunOS

UPEL 2.0

H3Linux 2.0

openEuler service partners (oESPs)

Commercial distributions

Kylinsec OS V3

Server

KylinsecEmbeddedOS V3

Embedded NEW

Kylin OS V10

Server

UnionTech OS Server 20 1020e/1050e

UnionTech OS Server 20 1060e NEW

Server

FusionOS

Server

ISSEL-22

Server

SUSE-Euler

Server

iSoft-Server-OS-5.1

Server

Red Flag Asianux Server OS 9.0

Server

JRLC OS 1.0

Embedded

HopeStage & HopeEdge V1.0

Server

Turbolinux 16

Server

Linx Secure OS for openEuler 6.0 (based on openEuler 20.03 LTS)

Linx Secure OS V6.0 (based on openEuler 22.03 LTS) NEW

Server

Industrial Embedded OS 1.0

Embedded

openEuler community distributions

A Prosperous Ecosystem to Satisfy Diversified Requirements

Innovation : Three Technical Feature Of openEuler

All Scenarios

Diversified Computing

AI For OS OS For AI

What is openEuler? A unified OS distribution platform For All Scenarios

Package pool

EulerMaker

Embedded OS

Edge OS

Server/Cloud OS

| Ecosystem interworking | Combination on demand |
| Technology sharing | Simplified interconnection |
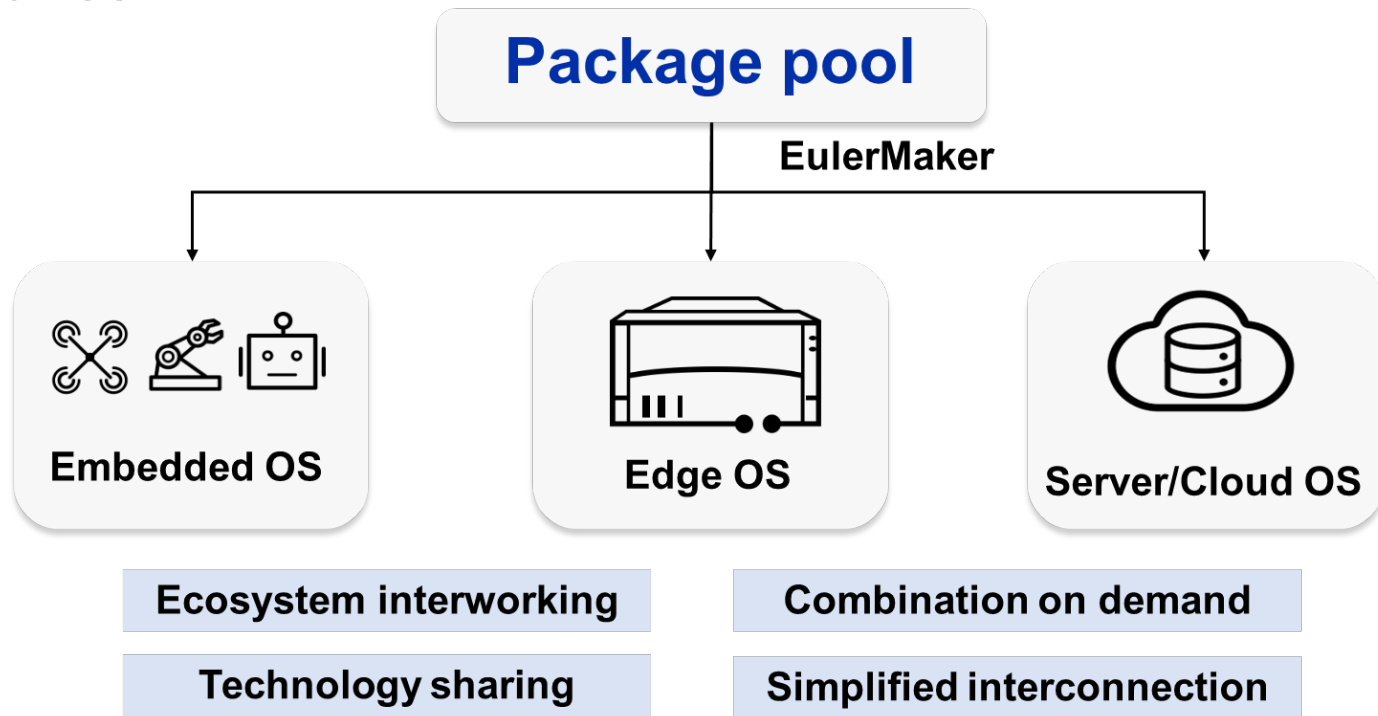
openEuler is an OS platform that allows OS creation for different scenarios.

EulerMaker：build platform for customizable OS

EulerMaker is a package building system. It builds source code to binary packages and system images. It allows developers to assemble and customize OS. Provides incremental/full build, hierarchical package customization and image customization.

customized Layers

For scenarios

customized layers	....
	Scenario layers
	BSP layers
	BASE_OS layer

场景化

Package Build

Build on demand Dynamic allocate

Web UI	CLI
Project	Database
DAG	Project Source
Scheduler	Repository

Multiple queues ⟷ Workers pool

HW	VM	Container

Image Build

Highly customizable

Image Tailor

ISO Image
- customize setup
- customize kickstart
- customize logo
- add packages

VM Image
- private
- cloud 1
- cloud 2

Container Image
- app1
- app2
- app3
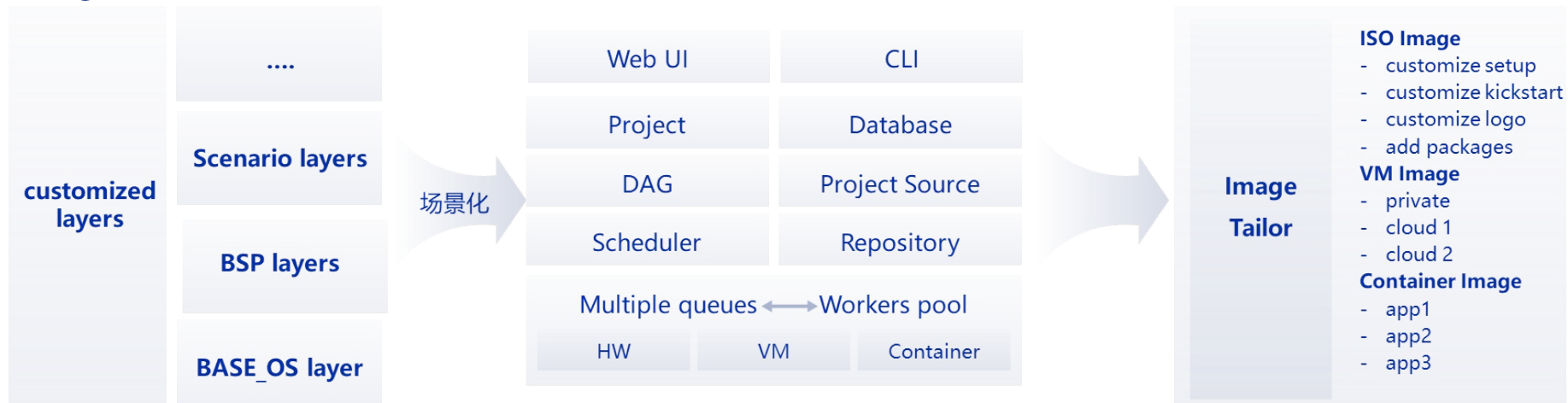
Source Package format: from spec to YAML (fields)

YAML with python expressions
Simple yet Flexible

```
Name: bubblewrap
Version: 0.4.1
Release: 1
Summary: Core execution tool for unprivileged containers
License: LGPLv2+
URL: https://github.com/projectatomic/bubblewrap
Source0:
https://github.com/containers/bubblewrap/releases/download/
v%{version}/bubblewrap-%{version}.tar.xz
BuildRequires: autoconf automake libtool gcc libcap-devel
BuildRequires: pkgconfig(libselinux) libxslt docbook-style-
xsl
%description
There is an effort in the Linux kernel called user
namespaces which
attempts to allow unprivileged users to use container
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```

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- "libxslt"
- "docbook-style-xsl"
source.0: https://github.com/containers/bubblewrap/releases/download/
v${{pkg.version}}/bubblewrap-${{pkg.version}}.tar.xz
```

Source Package format: from spec to YAML

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```

BaseOS supports open customization

Any field is customizable

version
source
patchset
requires
buildRequires
phase.prep
phase.configure
phase.cmake
phase.build
phase.install
phase.check
runtimePhase.pre
runtimePhase.post
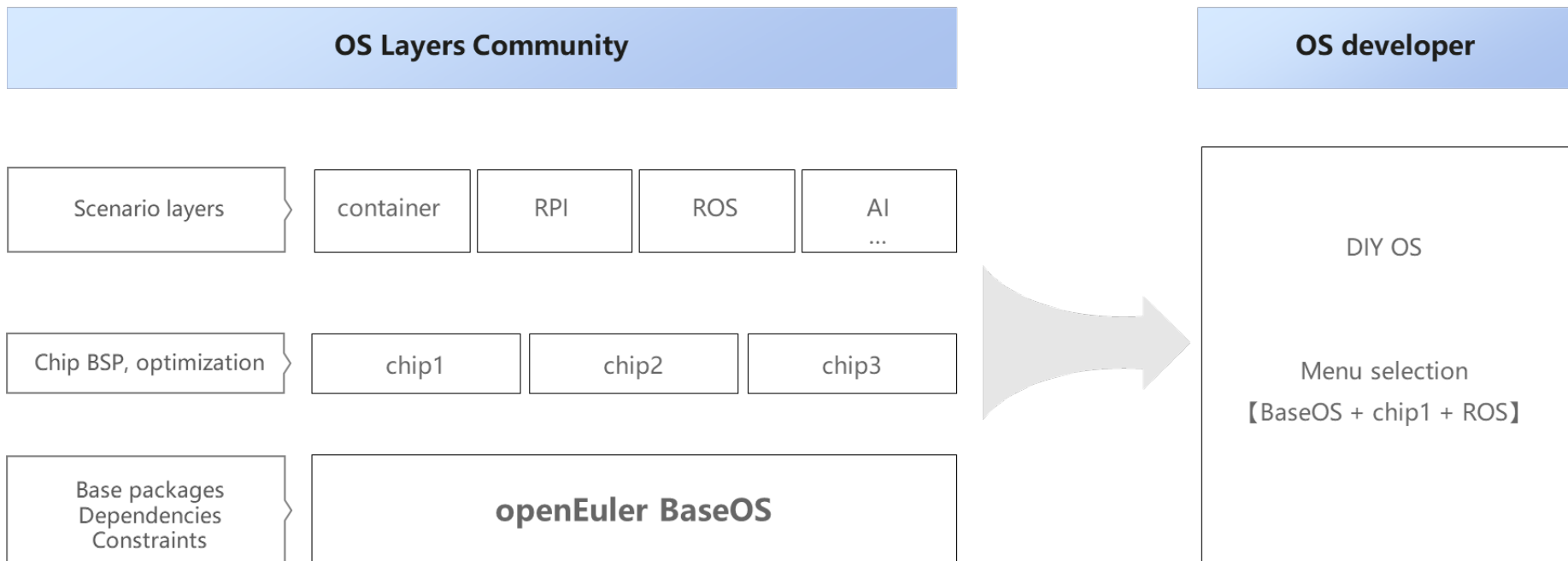runtimePhase.preun
runtimePhase.postun

New build flags

build.toolchain
build.cflags
build.cxxflags
build.fflags
build.cppflags
build.ldflags
build.ldlibs
build.configure.flags
build.make.flags
build.cmake.flags
build.meson.flags
build.pytest.flags
build.qmake.flags
build.npm.flags
build.check.flags
build.scons.flags
build.cargo.flags

Optional features

use.test
use.doc
use.debug
use.static
use.libs
use.examples
use.nls
use.X
use.selinux
use.ssl
use.gtk
use.systemd
use.python

use.alsa
use.minimal
use.zlib
use.threads
use.dbus
use.opengl
use.ipv6
use.mysql
use.sqlite
use.postgres
use.pam
use.jpeg
use.tools
use.png
use.gnutls
use.wayland
use.readline

Layered customization：DIY OS like LEGO

OS Layers Community

| Scenario layers | container | RPI | ROS | AI ... |

| Chip BSP, optimization | chip1 | chip2 | chip3 |

| Base packages Dependencies Constraints | openEuler BaseOS |

OS developer

DIY OS

Menu selection
【BaseOS + chip1 + ROS】

openEuler: An OS for diversified and intelligent computing in all scenarios

Information **T**echnology **+** **C**ommunication **T**echnology **+** **O**perational **T**echnology

CRM   ERP   BSS/OSS   NFV   DCS   SCADA   PLC   ...

10,000 + mainstream applications: AI, cloud native, big data, CDN, MEC, industrial control ...

100% support for mainstream scenarios

openEuler

One OS Platform For All Arch

100% support for mainstream architectures

x86, Arm, RISC-V, SW-64, LoongArch, and Power
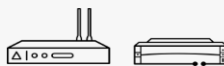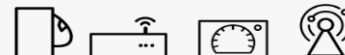
Server   Cloud   Edge   Embedded

ARM architecture is the Top Priority for openEuler

➢ **A Wider ARM hardware support**

  ➢ Support ARM64 chips such as Kunpeng, Phytium, and Raspberry Pi and etc.

  ➢ Backport ARMv8 and ARMv9 new features to openEuler 20.03 (4.19 kernel) and 22.03(5.10 kernel).

➢ **Better performance**

  ✓ Better performance for Virtual machine, MySQL, Ceph and Big data, such as memory management (Folio, TLBI) and IO data path (SMMU, GICv4.1) optimizations.

➢ **Better RAS features for ARM server**

  ✓ Memory mirror for ARMv8 architecture, kdump for ARM64, MC safe memory copy and etc.

➢ **Upstream First, TOP contributor for Linux kernel Mainline**

  ✓ TOP1 patch contributor for 5.10, 5.14 and 6.1 kernel.

  ✓ We have Maintainers/Reviewers for Linux mainline kernel such as ACPI for ARM64, KVM for ARM64 and etc., due to the continuous contribution for ARM architecture.

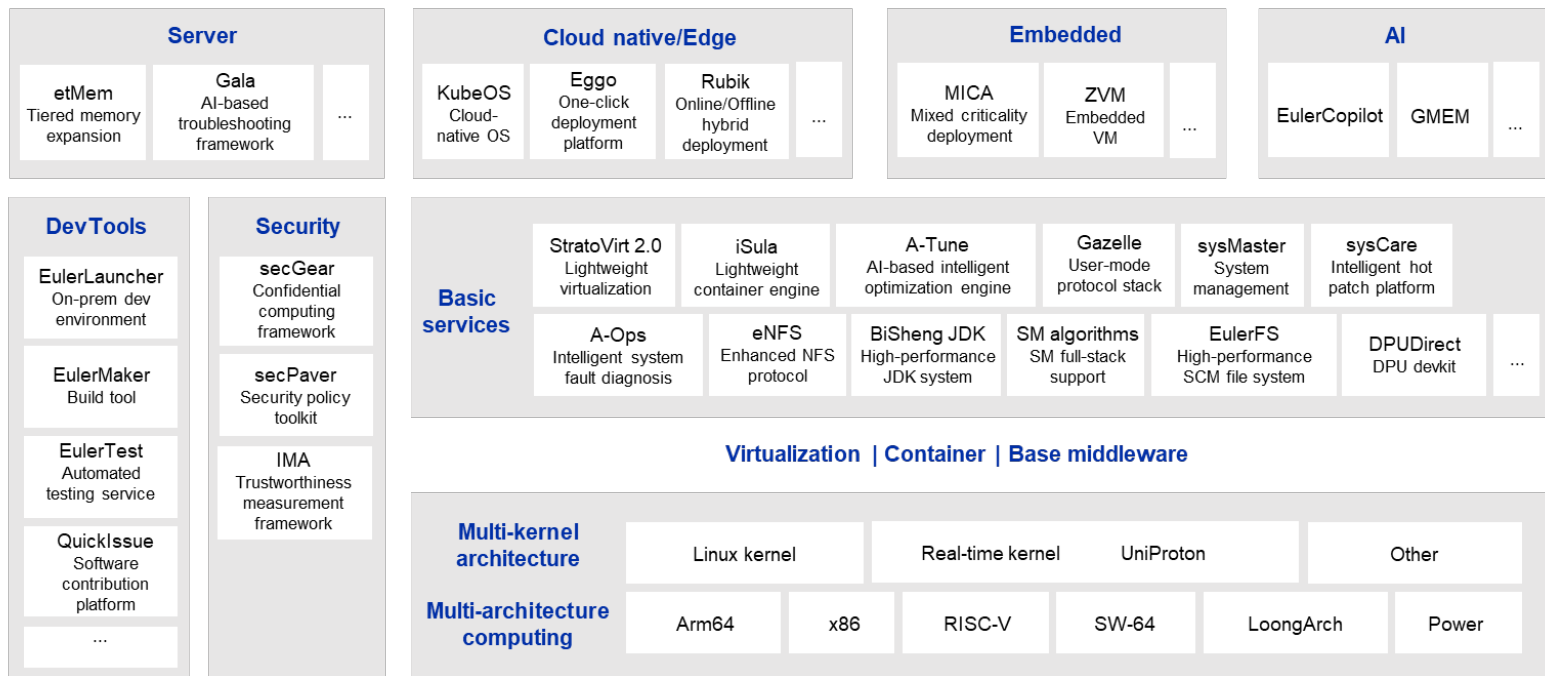# AI for OS: Accelerating the arrival of tomorrow's intelligent world

Intelligent tuning
Heuristic OS tuning and automatic report generation

AI for OS: Accelerating the arrival of tomorrow's intelligent world
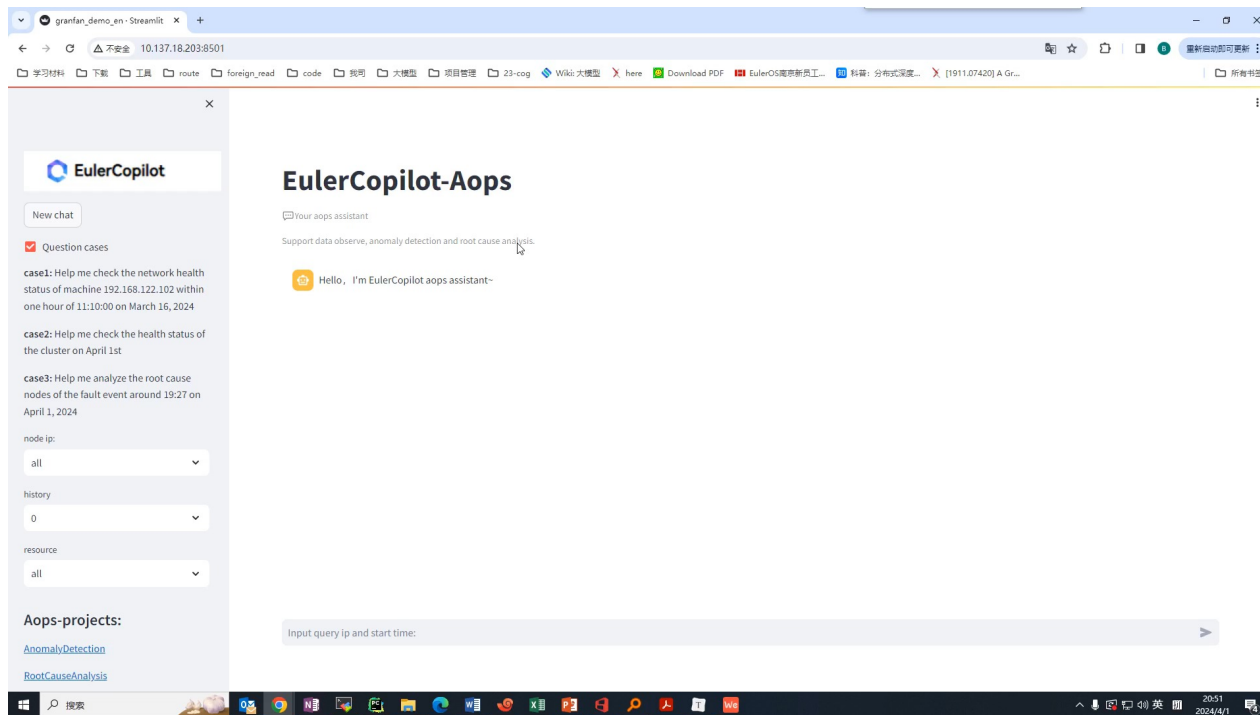
Intelligent O&M
Automated OS O&M and expert-level diagnosis report generation

Collaborative development for full-stack innovation

Server

etMem	Gala	
Tiered memory expansion	AI-based troubleshooting framework	...

Cloud native/Edge

KubeOS	Eggo	Rubik	
Cloud-native OS	One-click deployment platform	Online/Offline hybrid deployment	...

Embedded

MICA	ZVM	
Mixed criticality deployment	Embedded VM	...

AI

EulerCopilot	GMEM	...

DevTools

EulerLauncher
On-prem dev environment

EulerMaker
Build tool

EulerTest
Automated testing service

QuickIssue
Software contribution platform

...

Security

secGear
Confidential computing framework

secPaver
Security policy toolkit

IMA
Trustworthiness measurement framework

Basic services

StratoVirt 2.0	iSula	A-Tune	Gazelle	sysMaster	sysCare
Lightweight virtualization	Lightweight container engine	AI-based intelligent optimization engine	User-mode protocol stack	System management	Intelligent hot patch platform

A-Ops	eNFS	BiSheng JDK	SM algorithms	EulerFS	DPUDirect	
Intelligent system fault diagnosis	Enhanced NFS protocol	High-performance JDK system	SM full-stack support	High-performance SCM file system	DPU devkit	...

Virtualization | Container | Base middleware

Multi-kernel architecture	Linux kernel	Real-time kernel	UniProton	Other

Multi-architecture computing	Arm64	x86	RISC-V	SW-64	LoongArch	Power

400+ code repos for innovation projects, with an average of 10 new innovation projects added each month

New features coming with openEuler Embedded

Strengthening the **mixed criticality system** and **lightweight robot runtime** and exploring **embedded edge** and **embedded AI**

Infrastructure	Linux framework	Key features	Ecosystem
➢ **build**	➢ **Kernel**	➢ **Mixed criticality system**	➢ **Application ecosystem**
• Multi-mode builds: native, prebuilt	• Dual kernels: 6.6 and 5.10	• Real-time virtualization: integration of ZVM, Rust-Shyper, ACRN, and Xen	• Robot: EulerARM
• Better ecosystem: meta-virtualization	• Open custom kernel (consistent with major versions)		• Open automation: OPC UA over TSN
➢ **oebuild**	➢ **Software packages**	➢ **Lightweight robot runtime**	• BMC: incubated MetaBMC
• runqemu: QEMU priority	• 800+ software packages	• Incubated AiROS industrial robot framework	➢ **BSP**
• SDK/IDE template generation	➢ **Images**	➢ **Embedded edge**	• HiEulerPi: OEE-native developer tool, officially released in March
➢ **CI/CD**	• Complete feature images (ROS 2, containers, and graphs)	• Interconnection with KubeEdge, K3s, and EdgeX	• 10+ BSPs: Focus on RISC-V improvement
• Sstate-cache accelerated build	➢ **Innovative features**	➢ **Embedded AI**	➢ **Ecosystem collaboration**
• Multi-test frameworks: mugen, ptest	• Preempt-RT: real-time analysis and optimization	• Support for AI frameworks such as MindSpore, TensorFlow Lite	• IDHs/OSVs: 10+
	• Lightweight and quick startup: efficient analysis and configuration		

New and improved experience coming in 2024

AI native

EulerCopilot: AI-assisted development with 70%+ higher domain knowledge accuracy, empowering AI developers

oeAware: system autonomous optimization, improving scenario-specific performance such as database by 15%

Converged memory & scheduling: 50% higher inference throughput

Cloud native

K8s distribution: one-click deployment of full-stack cloud-native lightweight distribution

Memory load-based scheduling: 80% faster container startup speed, adaptation and maintenance-free zero

Topology-aware computing: iSulad, supporting NRI and CDI

Hardware collaborative

Folio: more efficient memory management, supporting 4K/64K large dynamic pages

Self-developed open source project for server BMC

Pooled memory management based on the new bus interconnection …

OpenEuler (openEuler 24.03 LTS (May, 2024), openEuler 22.03 SP4 (June, 2024))

How to engage

@openEuler
https://twitter.com/openEuler

r/openEuler
https://new.reddit.com/r/openEuler/

openEuler
https://www.youtube.com/@openeuler/

openEuler
https://www.linkedin.com/company/86315548/

Official website

LinkedIn newsletter

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Join SIGs

Download

Let's Bring Something New To OS And Support ARM Eco Better