Ascending to new heights with Huawei Cloud AI

On the third day of HUAWEI CONNECT 2019, Huawei officially released its Huawei Developer Program 2.0 program, backed by an investment of US$1.5 billion. Designed to cultivate the skills of 5 million developers worldwide over the next five years, the program will help develop an inclusive computing industry ecosystem for enterprises and individual developers. In addition, Huawei released its first Ascend AI and Kunpeng Developer Kit tutorials.

By Patrick Zhang, CTO, Cloud & AI Products & Services, Huawei

Developers can make the impossible possible

This summer's Amazon forest fires prompted deeper questions about how we can protect rainforests from deforestation and maintain animals' habitats. This is something we're already actively involved in. The NGO Rainforest Connection uses upcycled Huawei phones to record the sounds of chainsaws, cars, and animals. RFCx uses big data analytics and AI processing on Huawei Cloud to listen to the rainforest and detect logging and poaching events in real time. They save the rainforest by listening.

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Another environmental impact that we face is desertification. East China University is using machine learning so robots can recognize and avoid the vegetation and obstacles in the desert. They're able to dig holes, plant saplings, and water plants, greatly improving the survival rate of vegetation.

ABB's "super scavenger" robots have made sorting garbage for recycling easier than ever, continuously learning, becoming smarter, and improving classification accuracy and efficiency.

The capabilities of AI are increasing exponentially. In the Digital China Innovation Contest, students from South China University of Technology used ModelArts to train AI to decipher ancient Chinese script, achieving an accuracy rate of more than 98 percent.

Dual engines provide developers with endless power

Huawei Kunpeng and Ascend's dual-engine cores provide developers with extensive access to the strongest available universal computing power. The open computing power covers operating systems to databases, compilers to development tools, and AI operators to AI development platforms. We believe that the openness of the computing power source is the only way to ensure a reliable developer ecosystem.

A new-gen, open AI platform for basic software and hardware

At the 2019 World Artificial Intelligence Conference, the Ministry of Science and Technology of China announced that Huawei would take a key role in building a new-generation open AI platform for basic software and hardware. The platform optimizes the entire stack based on Huawei in-house chips, boards, basic operator libraries, and basic framework, and provides full-process and open platform services. It enables application innovation in cloud, edge, and device scenarios, enabling research institutes to run more rigorous research and to build their own open AI applications and systems.

> " In the future, computing and intelligence will be pervasive. To ensure developers have the skillset to deploy cloud services in all scenarios by simply developing software once, Huawei has developed a solution that covers all device, edge, and cloud scenarios. "

Huawei FusionPlant was selected as a key industrial Internet platform in 2019

This year, China's Ministry of Industry and Information Technology released a list of industrial Internet platforms across a range of industries and sectors, and selected Huawei FusionPlant industrial Internet platform as the key product. Leveraging Huawei's 30 years of ICT technology and manufacturing experience, this platform is designed to be open and shared. Based on Huawei Cloud Kunpeng computing, AI, and IoT technologies, the Huawei FusionPlant platform works with industry partners to help enterprises transform to the cloud and the platform, and implement network-based, digital, and intelligent services that are higher quality, lower cost, and higher efficiency.

Homogeneous device-cloud supercharges massive mobile apps to the cloud

In the 5G era, massive volumes of mobile intelligent apps are migrating from the device side to the cloud. Applications that are migrated to x86 servers may need code conversion because the cloud and device computing architectures are different. Although it's easy to perform using instruction translation, this can account for a performance loss of up to 40 percent.

Huawei Cloud provides the Kunpeng native Cloud Phone Solution, which enables the same instruction set to run on cloud and devices. When Android apps are cloudified, performance is unaffected. Currently, Cocos and other game platforms use Huawei Kunpeng cloud services to run their Android game apps, providing a smoother game experience for users and eliminating the need for high-configuration smart devices. Huawei Cloud Phone accelerates the R&D of Huawei's new mobile phone products. The Kunpeng cloud test platform replaces real mobile phones, and 80 percent of test cases are automatically completed, doubling test regression efficiency.

Kunpeng encryption and decryption engines improve the HTTPS performance of web applications

But, how can we improve encryption and decryption performance while maintaining security? x86 servers use PCIe encryption cards for acceleration, whereas Kunpeng CPUs use built-in encryption and decryption engines that interconnect through on-chip buses. The

Dual Engines Provide Developers with Endless Power
"硬核双引擎"为开发者提供了澎湃动力

Native apps
Cloud services
Big data
Database
Distributed storage
...

GaussDB
OpenEuler
Toolsets
Compiler

Kunpeng
General-purpose processor
鲲鹏
通用处理器

Ascend
AI processor
昇腾
AI处理器

AI Marketplace
ModelArts
MindSpore
CANN

Smart finance
Smart government
Smart retail
Smart transportation
Smart energy
...

HTTPS short connection performance of Jingdong Digital Technology web applications running the Kunpeng CPUs is increased by 45 percent.

Develop once and deploy everywhere for pervasive intelligent computing

In the future, computing and intelligence will be pervasive. To ensure developers have the skillset to deploy cloud services in all scenarios by simply developing software once, Huawei has developed a solution that covers all device, edge, and cloud scenarios. This solution allows developers to perform one-off development for full-scenario deployment, meaning all the benefits at a fraction of the cost and labor requirements.

• The solution provides unified running environment and instruction sets, and supports Kunpeng general computing and Ascend AI computing on devices, edges, and cloud.

• Huawei is a key contributor to the open source community KubeEdge and can run lightweight containers that have the same architecture as cloud Kubernetes on the edge nodes.

• The device-edge-cloud intelligent computing is based on the unified Da Vinci architecture. The models for cloud and edge training are adjustable.

Device-edge-cloud computing synergy has been widely used in smart finance, smart retail, smart grid, and highway tolling scenarios.

Migrating existing software from x86 to Kunpeng

For software developed in interpreted languages such as Java and Python, users only need to install and run ARM JVM without modifying the source code of software. For C/C++ and Go software, the Kunpeng compiler can recompile the software or modify code as performance improves after tuning. For software developed in the assembly languages, you need to rewrite the software. Software without code can be transplanted through instruction translation.

Huawei Kunpeng Developer Kit

To easily and efficiently develop on or migrate software to the Kunpeng computing platform, Huawei has released the Kunpeng Developer Kit, which consists of Compiler Collection and the tool trio of Dependency Advisor, Porting Advisor, and Tuning Kit.

Software development platform for Kunpeng developers

Huawei Cloud DevCloud provides developers with software development tools for the entire lifecycle, facilitating software based on the Kunpeng computing platform designed for cloud.

The Compiler Collection is integrated into DevCloud. Developers can use DevCloud to compile software that can run on the Kunpeng platform. During compilation, DevCloud can automatically obtain the latest software packages and dependency libraries from Huawei Mirrors. After compilation is complete, developers can use DevCloud to automatically deploy software on cloud services such as Huawei Cloud Kunpeng ECS or Kunpeng Container.

DevCloud also provides a visualized and customizable automatic delivery pipeline to help developers streamline the entire process covering requirements, development and testing, building, and deployment, significantly shortening the software delivery period.

Many of Huawei's open source programs are hosted on DevCloud's CodeHub. This platform is inclusive and transparent, and open to all who wish to participate in open source programs and build a joint Kunpeng ecosystem.

Inclusive AI for developers

While AI technologies are in abundance, they're often difficult to manage, there aren't enough experts to manage them, and computing power is scarce and expensive. In response, Huawei built an easy-to-use, affordable, and inclusive AI for developers, from beginner level to expert, with full service support.

For AI beginners who lack AI development experience, the automatic learning technology of ModelArts enables them to complete development in three

Ascend AI Processor Architecture & Programming
《昇腾AI处理器架构与编程》发布

> The world's fastest AI training cluster Atlas 900 can be widely used in scientific research and business innovation, because it enables researchers to quickly train AI models using image and audio data.

steps. For example:

- Upload an image confirming workers are wearing safety helmets, and upload and label the image data to the training dataset

- Start AI model training with just one click. The system automatically selects the network structure and generates a model through training.

- After the training is complete, deploy the model. The model runs and provides services. Upload an image, and the system will tell you whether the worker is wearing a safety helmet.

To help AI engineers develop high-performance AI applications, Ascend provides a Huawei-developed Mindspore computing framework. This supports mainstream frameworks such as TensorFlow and PyTorch, and provides rich operator libraries and model algorithms for different service requirements. To improve computing efficiency, you can adjust the I/O channel of the convolution operator Conv and the concatenation operator Concat, or select the fusion operators (Conv+Bn+Scale+Relu). You can also optimize the size of the feature maps and steps, and optimize the hyperparameter configuration.

The world's fastest AI training cluster, Atlas 900, can be widely used in scientific research and business innovation, because it enables researchers to quickly train AI models using image and audio data.

If the preconfigured standard operator libraries provided by the framework cannot meet requirements during neural network modeling, experienced AI personnel can use the TBE tensor acceleration engine in Ascend to customize new operators. These include operator calculation logic compilation, data shape segmentation, data flow rules, memory allocation, and the allocation of computing units such as matrices and vectors.

With efficient operator development, AI experts can flexibly and quickly innovate AI technologies and explore scientific research, create new neural networks, and tailor AI frameworks to specific fields.

Huawei Developer Program 2.0

At the first Huawei Developer Conference in 2015, Huawei released the Huawei Developer Program. This program would go on to invest nearly US$1 billion in five years to provide developers with a suitable environment to innovate technologies and businesses based on Huawei's open-source products and services.

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- In the past five years, we've shared capabilities on Huawei's ICT products, IT products, cloud services, Ascend AI computing, and Kunpeng computing.

- Twenty-one OpenLabs have been established around the world.

- Developer Community and the Huawei Cloud Academy have been set up on the Huawei official website and Huawei Cloud official website, respectively.

- Summits, technical salons, and developer contests are held offline every month.

- Huawei technical certification and talent certification are available every day.

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In the next five years, Huawei plans to use Huawei Developer Program 2.0 to cover the following five dimensions:

- In terms of products, we will focus on two core processors, Kunpeng and Ascend, to build an open source computing ecosystem. We will gradually establish a wider open source community covering operating systems, databases, product services, and development tool chains.

- We plan to build a training system comprising Huawei Cloud online communities, offline OpenLabs, and DevRun developer salons in cities, and even on-site tailor-made services. Developers and other ecosystem partners will have full access to Huawei's extensive system support.

- We will establish more pragmatic industry alliances that together with improved standards, will jointly expand markets. We plan to promote the development of industry standards, specifications, show cases, and technical certification systems.

- We will build an application ecosystem by industry and build an industry ecosystem within regions.

- We will further collaborate with education and scientific research institutes to ensure that new generations of students become proficient in Kunpeng and Ascend computing technologies. We also plan to conduct research with research institutes to enhance computing power.

> " Huawei Developer Program 2.0 will optimize our processes, communities, and resource configuration based on the LEADS concept: Lab as a Service, End-to-End, Agile, Dedicated, and Social. "

We're planning to release a series of books on Huawei's intelligent computing technologies for college students as optional tutorials. These include the Kunpeng processor, Ascend AI processor, and cloud native software development method tutorials.

We've also officially released the first textbook for Ascend AI tutorials.

Huawei Developer Program 2.0 will optimize our processes, communities, and resource configuration based on the LEADS concept: Lab as a Service, End-to-End, Agile, Dedicated, and Social. This concept will act as the understanding, learning, building, and go-to-market of new development processes. The concept is designed to help developers harness new skills and develop their solutions more efficiently on Huawei's platform.

We will also set up three types of funds: the learning development fund (LGF), product development fund (PDF), and marketing development fund (MDF). These cover the three phases of developer learning, product building, and product go-to-market. In every step and stage of developer development, Huawei will provide the support when needed.

Huawei Developer Program 2.0 classifies developers into four types: individual, universities and institutes, startups, and partners. Huawei provides tailored training support plans for each type. For example, schools that work with us will enjoy free learning cash coupons and preferential equipment support.

Huawei Developer Program 2.0 provides multiple support resources, including Kunpeng development samples, Ascend training cards, OpenLabs, training and certification services, technical support for ISV application migration, Huawei FAE development support services, and showcase support, as well as contests, cloud service cash coupons, and other ISV marketing activities.

Huawei will also use DevRun developer salons, industry connection meetings, Huawei Cloud Marketplace, industry innovation centers, DeveloperWorks, and other marketing activities, to build a diverse, dynamic, and symbiotic ecosystem for connecting new customers and partner resources. Every developer that has joined Huawei's ecosystem platform will be able to access the latest and greatest technologies, and also find business opportunities to make the impossible possible. ▪