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Automotive Intelligent Cockpit Platform Research Report, 2022

May 2022

Intelligent cockpits rush into a new era of "cross-domain integration and layered software design"

Research on Intelligent Cockpit Platforms: Intelligent cockpits rush into a new era of "cross-domain integration and layered software design“

Cockpit hardware platform field: Faster cross-domain integration layout

Driven by centralization of EEA, high-computing-power chips and improved software development capabilities, cockpit domain is constantly integrating new functions, and the intelligent cockpit is evolving from a single domain to cross-domain integration, such as integration of cockpit domain and ADAS domain. Some enterprises even have embarked on R&D layout of vehicle-cloud integrated multi-domain central computing platforms.

At the beginning of 2022, Thundersoft released a new Intelligent cockpit solution. Based on Qualcomm SA8295, it is a one-core multi-screen cockpit domain control solution. With high computing power and multiple cameras, it integrates low-speed assisted driving and cockpit domain to better support 360° surround view and smart parking.

In addition, Thundersoft uses Qualcomm 8795 chip to deploy cockpits and domain integration in the field of autonomous driving. Mass production is planned for 2024.

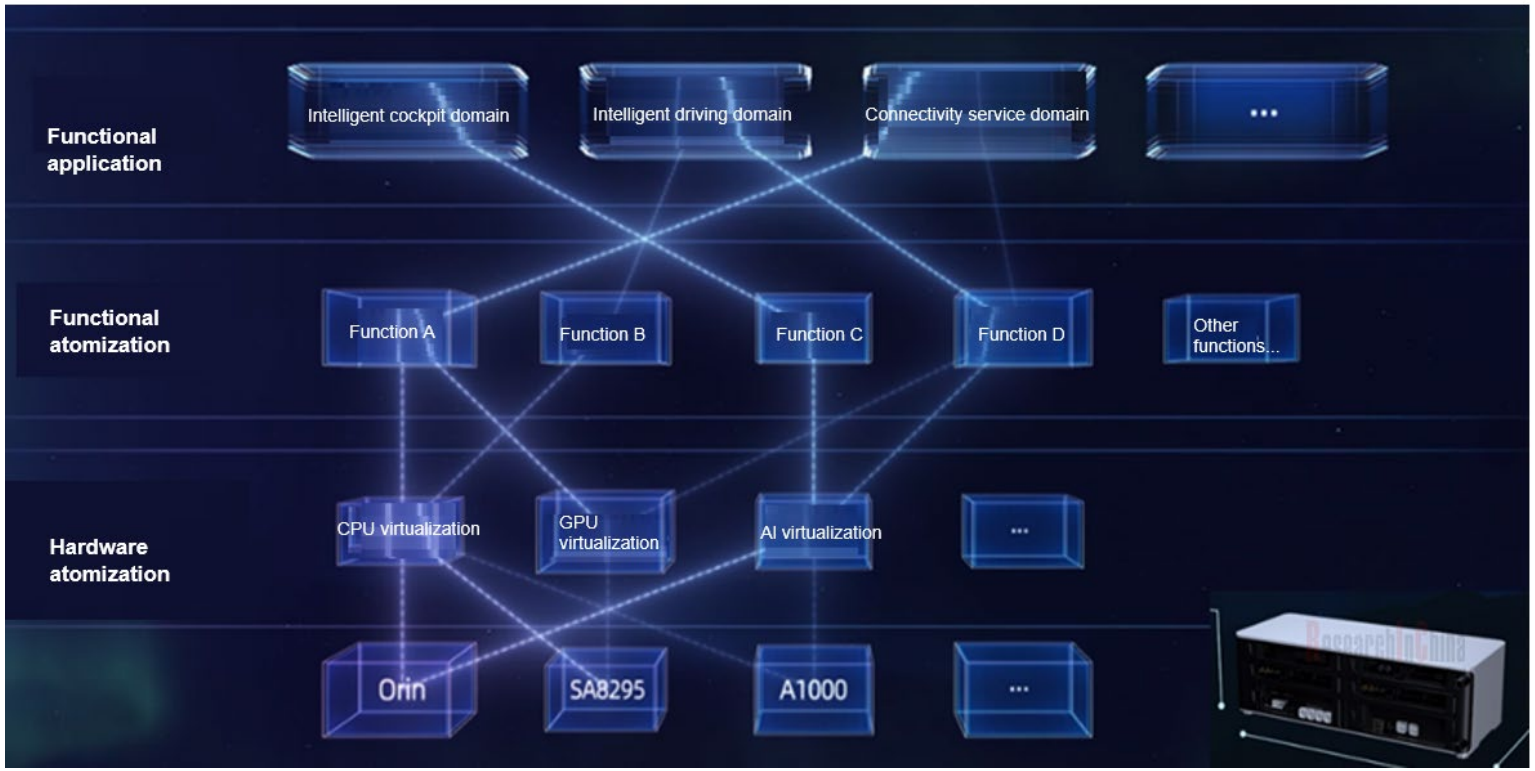
Thundersoft's Cockpit Supports Surround view and Smart Parking

Cockpit Domain Control Products of Bosch and Desay SV

In 2021, Bosch China's first cockpit domain control product was mass-produced. At present, Bosch is actively exploring a vehicle-cockpit-driving integration platform that conforms to the central E/E architecture. The hardware will be designed in the form like a pluggable blade. Combined with a cross-domain SOA platform, a set of middleware meet the demand of both intelligent driving and intelligent cockpits to integrate information between all domains of the vehicle, allocate computing power, and promote the application of cross-domain integration.

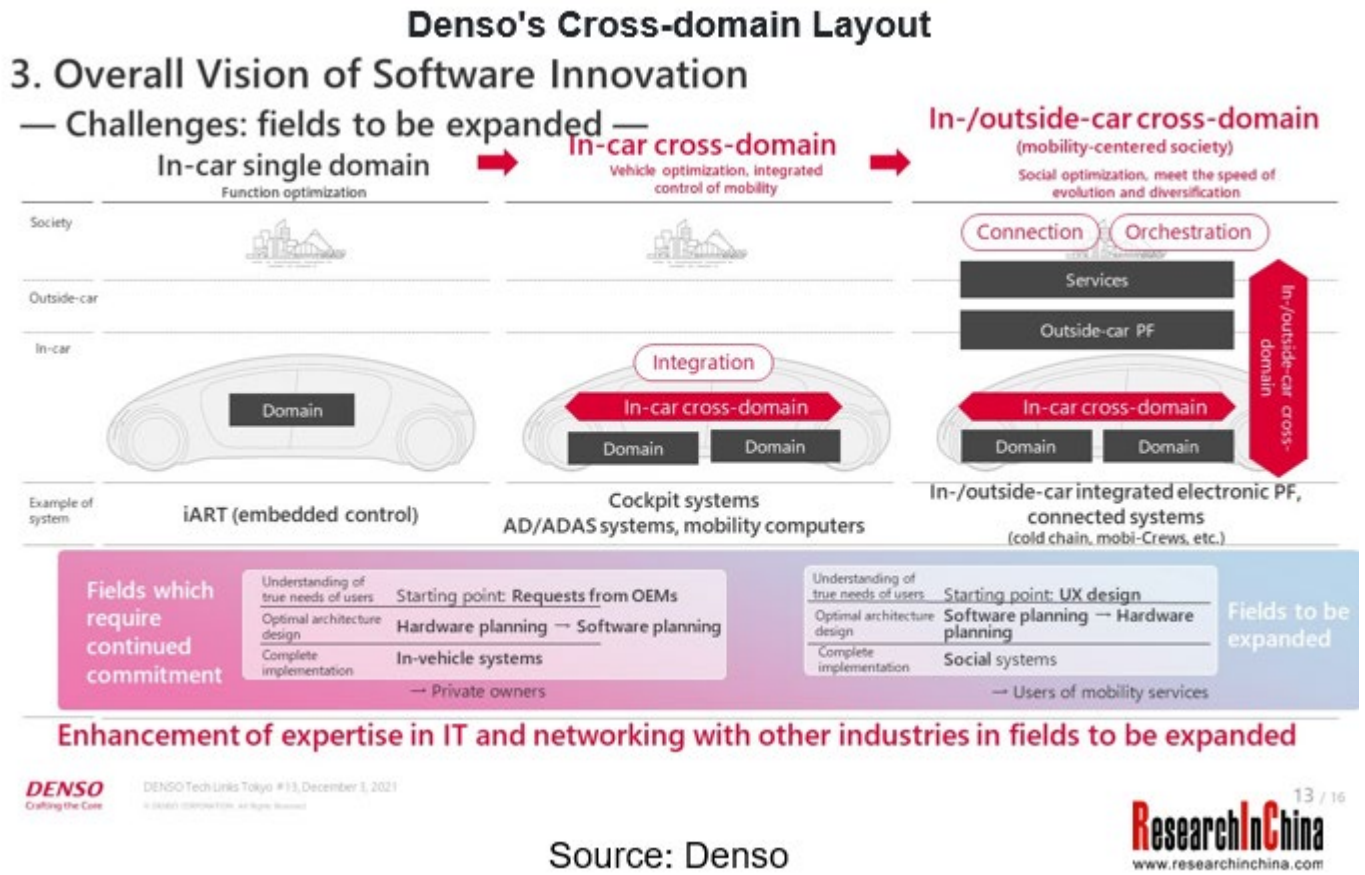
In April 2022, Desay SV released the first-generation mass-produced in-vehicle intelligent computing platform "Aurora", which integrates core functional domains such as intelligent cockpits, intelligent driving and connected services, realizes cross-domain integration from "domain control" to "central computing", and features intelligent computing, multi-domain integration, intelligent expansion (flexible configuration of "building blocks"), intelligent integration (designed for the open SOA platform), ASIL D, environmental protection and sustainability.

Desay SV's First-generation ICP: Aurora



Denso’s Cross-domain Layout

Denso is actively making breakthroughs in the fields of domains, cross-domain and even vehicle-cloud integration. In the future, its business scope will expand to the infrastructure and public sectors, and it will connect vehicles with cloud and infrastructure. In terms of cross-domain controllers, Denso will strengthen software development and cooperate with OEMs and technology companies.



Source: Denso

Cockpit software platform: SOA and layered design?

Cockpit software platform: SOA and layered design

In the context of software-defined vehicles, software and hardware decoupling has become an inevitable trend on the basis of SOA. Cockpit software platforms are gradually evolving from fragmentation to modular platformization, and tending to layered design (that is, OS, middleware, basic software platform, application software platform, and application ecological services are distributed at different levels). Software technology companies have launched cockpit software platforms.

Through the standardization, modularization and reusability of software platforms, the software development cycle can be significantly reduced, and the development process can be simplified. At the same time, application software and services can be customized upon demand, allowing users to enjoy differentiated functions and experience. With the continuous evolution of EEA, software platforms are moving from single-domain to multi-domain/cross-domain and even vehicle-cloud integrated software platforms.

Cockpit Software Platforms of Some Enterprises

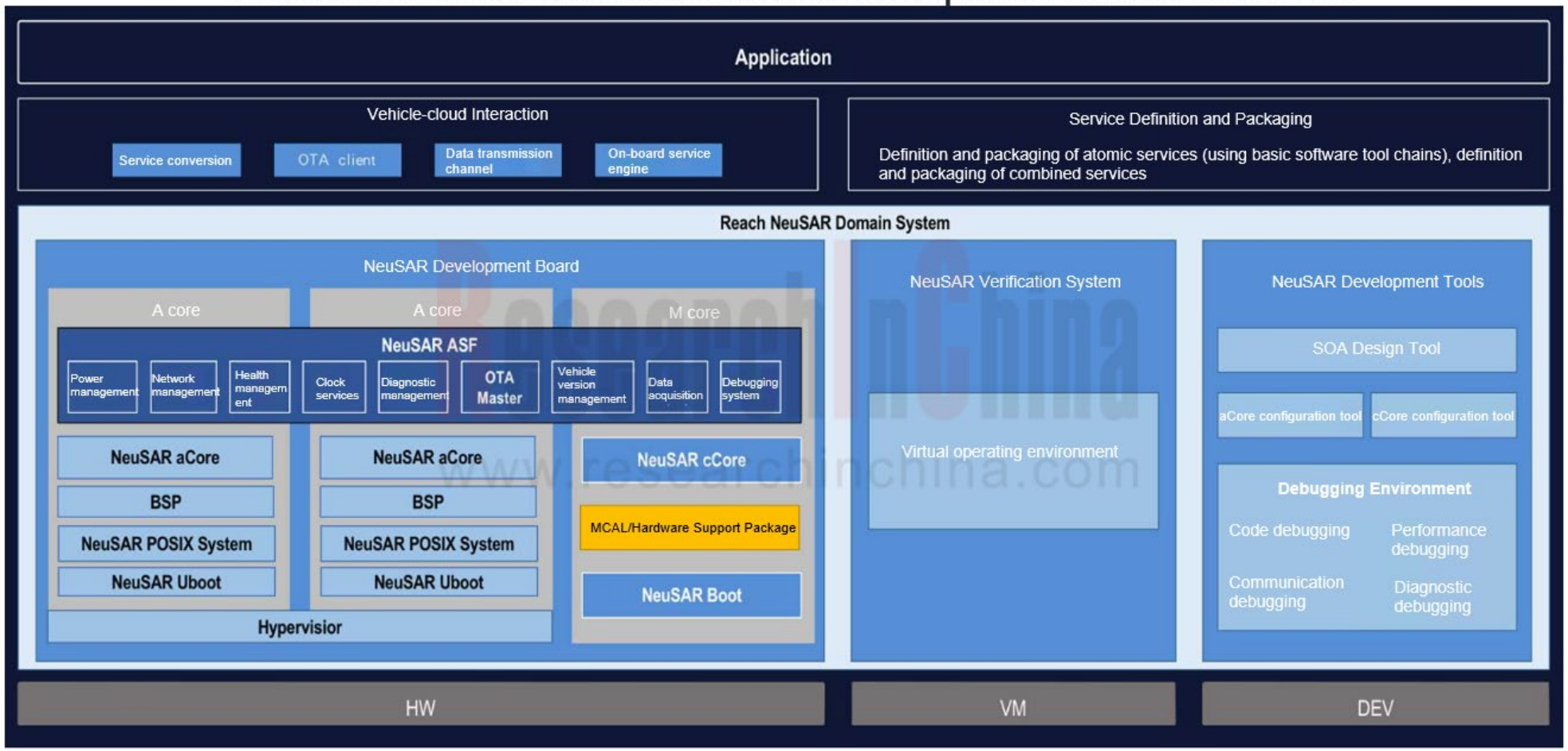
Enterprises	Release date	Software platform	Main Features
诚迈科技 ARCHERMIND	2021	Intelligent Cockpit Software Platform EX5.0	One-chip multi-system, based on BlackBerry virtualization. Support multiple hardware platforms, multiple operating systems
KOTEI	2021	KSC2.0 Cockpit Solution	Based on Renesas R-CAR chip and QNX Hypervisor+QNX+Android
HARMAN	2021	Cockpit Software Architecture	Provide very flexible cooperation models, ranging from hardware and underlying drivers to virtualization and operating systems according to the requirements of automakers, then to middleware and application software so as to cater to different customers
HUAWEI	2021	Huawei HarmonyOS-A software platform	Based on HarmonyOS The open platform provides standardized interfaces
Megatronix	2020	Megatronix SmartMega Core automotive software standard function module	Standardized interfaces, standard components of building blocks, cross-hardware platforms, cross-OS, cross-models, cross-components
TOMTOM	2021	Open digital cockpit software platform: IndiGO	The modular and open platform brings the users' digital life and automotive functions seamlessly and securely into the dashboard experience
ECARX	2022	Cross-platform general OS-level software framework: EAS Core	With terminal-cloud integrated services and scalable architecture, it provides more than 4,000 API interfaces as well as complete development kits and tools that satisfy automotive security

Source: ResearchInChina

Neusoft Reach: NeuSAR DS

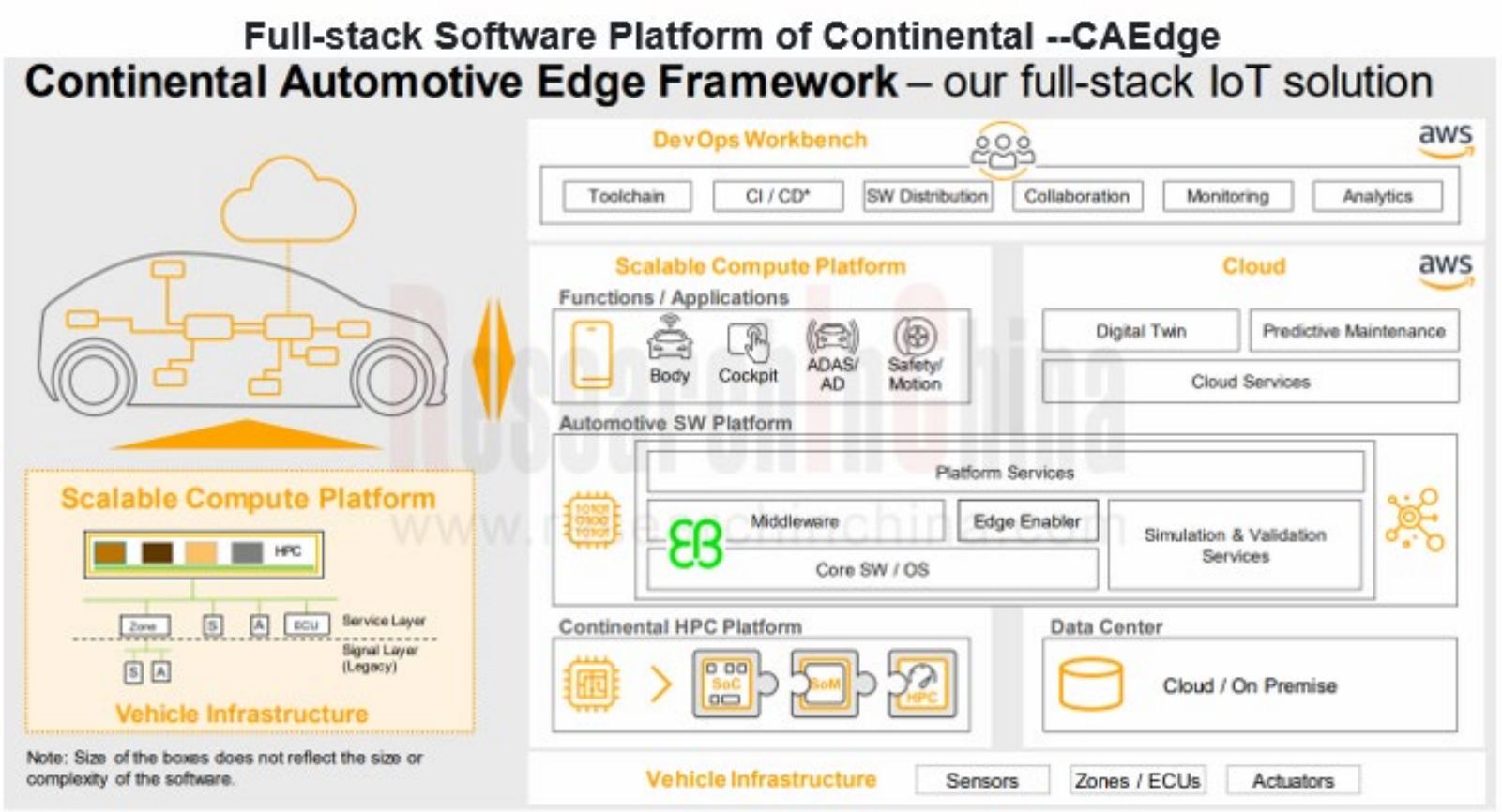
In April 2022, Neusoft Reach released the domain controller software development platform NeuSAR DS (Domain System), which can provide complete underlying software systems and virtualization on the domain controller SOC and MCU. It covers the software stack and tool chain required by the entire development process as well as engineering adaptation for typical chips, so as to realize the SOA design and development from the perspective of the whole vehicle. It allows developers to complete entire development process in a tool chain, and enables upstream and downstream development processes to be more closely coordinated.

Neusoft Reach's Domain Control Software Development Platform: NeuSAR DS



Full-Stack Software Platform of Continental-CAEdge

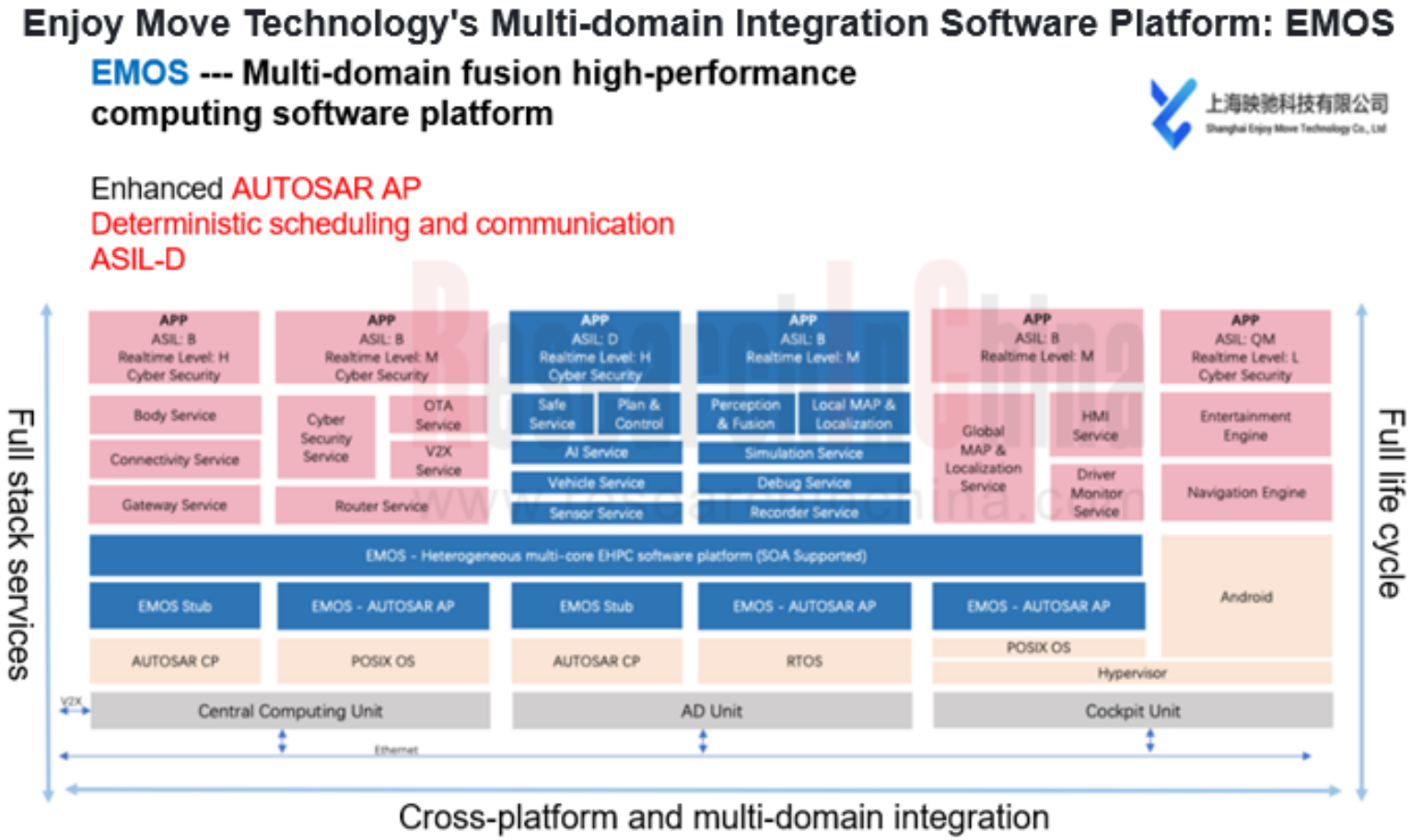
At CES 2022, Continental demonstrated how software and powerful IT infrastructure based on Continental Automotive Edge Framework enable new functions and are transforming mobility. This modular hardware and software platform connects vehicle to cloud and features numerous options to develop, supply and maintain software-intensive system functions. The platform also provides a software-intensive automotive architecture development environment for automakers and partners, greatly shortening development cycles and reducing development costs.



Enjoy Move Technology multi-domain integration software platform EMOS

In 2021, ArcherMind launched the intelligent domain control Fusion SOA platform, which deeply customizes AUTOSAR protocol stack based on NXP32G (body domain) and Qualcomm 8155 (intelligent cockpit domain) to achieve cross-domain integration and global SOA services. It is compatible with QNX, Android, Linux, etc.

In 2021, Enjoy Move Technology mass-produced multi-domain integration software platform EMOS which integrates the enhanced AutoSAR AP (with self-developed deterministic scheduling and communication) and conventional CP. Covering the vehicle central computing unit, autonomous driving domain control and cockpit domain control (the key functional safety part), the entire architecture is oriented to SOA, and all of its modules and services are developed through a standardized model to maximize compatibility between services and other modules.



OEMs: Enhanced self-research capabilities, improved rights in cockpit development

According to the current layout, OEM cockpit system solutions are transferring from Tier 1 supplies to multi-supplier joint development and flattened cooperation. With the continuous enhancement of self-research capabilities, OEMs will have a greater right to speak in the field of customization such as cockpit system development.

In terms of products, OEM cockpit single-domain control products have been mass-produced and installed. OEMs are vigorously deploying cross-domain integration, central computing platforms and self-developed OS/SOA platform, gradually moving towards SOA-based intelligent cars.

At the software level, OEMs have announced that they will develop automotive operating systems and basic software platforms, such as Volkswagen VW.OS, Mercedes-Benz MB.OS, Hyundai CCOS, Toyota Arene, etc.

Future Cockpit Planning and Layout of Some OEMs

OEMs	Planning	
	Hardware	Software
Mercedes-Benz	Qualcomm cockpit SoC/deep cooperation with NVIDIA in high-end chips	Self-developed MB.OS (2024)
Volkswagen/Audi	Further domain-integrated development of E 2.0 architecture, with fewer ECUs	Development of a unified and scalable software platform SSP using VW.OS 2.0 (2024)
Toyota	Powered by Renesas' latest R Car cockpit SoC	Self-developed OS: Arene (2025)
Hyundai	Powered by NVIDIA Drive platform	Self-developed CCOS
GAC	The latest car-cloud centralized computing EEA - Protoss architecture (2023) is equipped with Qualcomm 8155/8295 chips	The intelligent operating system G-OS (created by Galaxyautotech). The future cockpit will adopt SOA to offer plug-and-play hardware and update software frequently
SAIC	Z-One Galaxy intelligent cockpit solution based on Qualcomm's fourth-generation cockpit SoC (2023). The cockpit-driving integrated computing platform HPC has a modular and scalable software-hardware integrated computing platform that integrates intelligent interactive experience and high-level autonomous driving (L4)	Pluggable and replaceable hardware + SOA cloud-management-terminal full-stack software platform
Geely	Self-developed cockpit SoC E01, E02. SE1000 from SiEngine Technology. Qualcomm SoC for high-end products	In cooperation with Ecarx, Zenseact, etc. for self-research of operating systems and core software algorithms
Xpeng	Self-developed domain control	The evolution of software to SOA services
Li Auto	Self-developed central domain + cockpit domain	Self-developed vehicle operating system HELiOS

Source: ResearchInChina

For intelligent cockpit suppliers, flexible supply, modularization and standardized platforms will be the future focus of their layout. Bosch has pointed out that it will focus on the common functions below the middle layer in terms of software, adopt a modular approach to iterate layer by layer from the bottom up, and realize the replacement and iteration of chips and applications through software and hardware standardized interfaces.

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