Press Release

Communication Gateway Aggregates ECUs
for Automotive SOA Architectures

New proof of concept (PoC) demonstrates a communication gateway ECU leveraging an open standard software model based on a service-oriented architecture (SOA). The PoC supports the development of central computing ECUs for vehicle-to-everything (V2X) communication.

Paris and Tokyo, 7th June 2022 – The automotive industry is facing the challenge of integrating the latest technologies into their vehicles, such as V2X communication, which is one of the key technologies behind automated driving and smart-traffic solutions. This is further complicated by the migration in advanced automotive architectures to a lower number of ECUs, which can number upwards of 100 in a legacy car. These advanced solutions require centralized high-performance computing devices, domain controllers, and intelligent sensors.

eSOL announced a proof of concept (PoC) demonstrating a communication gateway ECU based on an open standard software model using a SOA on Renesas Electronics' in-vehicle SoC (System on Chip) products. The PoC paves the way towards the development of central computing ECUs for demanding automotive functionalities like V2X communication, and addresses the challenge of supporting the most advanced automotive architectures.

The PoC is based on the multikernel eMCOS® RTOS platform, using heterogeneous eMCOS profiles leveraging the heterogeneous multiprocessor architecture used in the Renesas R-Car S4 SoC. This configuration offers outstanding real-time performance, energy efficiency, and system flexibility. Connecting the ECUs with a fast communication gateway that links the control units to each other, and also links the vehicle to the cloud in a secure and safe way, enables functionalities like V2X, OTA, and other new services for the driver.
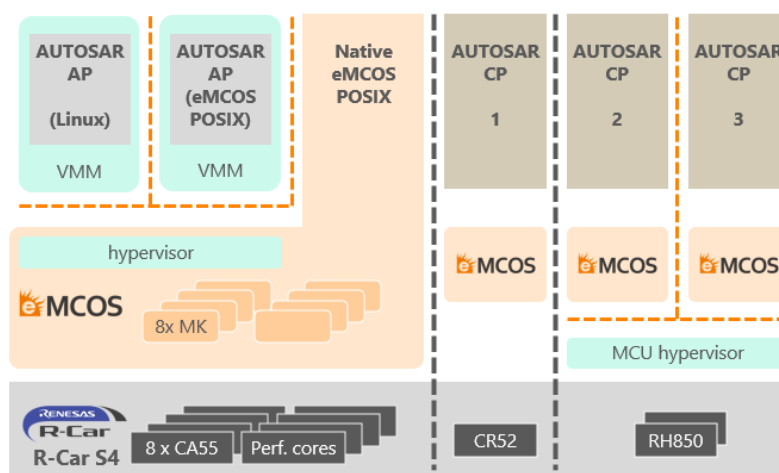
MK: microkernel of multikernel
VMM: virtual machine monitor
Perf. cores: performance cores
CR/RH850: safety cores

The software of these heterogeneous computing solutions will be developed based on the SOA, with eSOL's eMCOS RTOS platform handling the safe and secure control of the heterogeneous hardware after booting. Each eMCOS profile provides the maximum possible multicore performance and FFI due to its unique multikernel architecture. At the same time, its lightweight inter-process communication features ensure fast and safe information exchange between applications on all heterogeneous cores.

The current eMCOS board support package for R-Car S4 also supports both the heterogeneous security hardware and the IPMMU for safe control of all peripherals by the RTOS. There is also support for Renesas' R-Switch 2, a high-performance 3-port Ethernet switch with support for the latest IEEE TSN standard.

"In line with Renesas strategy of 'Software first', we are glad that our partner eSOL now supports the R-Car S4 SoC for connected gateways with their eMCOS" said Yusuke Kawasaki, Director of Easy To Start Department Automotive Digital Products Marketing Division at Renesas Electronics. "Together with our partners, we will continue to strengthen the ecosystem coverage for our products to allow business acceleration by customers."

In the PoC, different eMCOS profiles are used. The eMCOS Hypervisor® is used on the high-performance 8x Arm® Cortex®-A55 cores, while an eMCOS AUTOSAR profile, based on an AUTOSAR Classic platform, is started on the Cortex-R52 core. In addition, the AUTOSAR Classic Platform is mounted on two RH850 G4MH cores. The high-performance 8x Cortex-A55 cores are safely and securely virtualized in real-time by eMCOS hypervisor to host AUTOSAR AP guests on Linux or eMCOS POSIX. With this type 1.5 hypervisor, it is also possible to host native POSIX processes in parallel, an advantage that legacy type 1 hypervisors do not offer.

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About eSOL Co., Ltd
Founded in 1975 and listed on the Prime Market of the Tokyo Stock Exchange (TSE: 4420), eSOL is a leading global company in the fields of embedded systems and edge computing that seeks to contribute to a safer and better-connected society. eSOL's high-performance and scalable software platform products and first-class professional services, centered around its unique and patented eMCOS multikernel real-time operating system (RTOS) technology, are used worldwide in demanding embedded application fields which conform to stringent quality, safety and security standards. This includes automotive systems as well as industrial equipment, satellites, medical and digital consumer electronics. In addition to the research and development of its leading-edge products, and joint research with major manufacturers and universities, eSOL is actively engaged in AUTOSAR, Autoware and multi/many-core technology standardization activities.

For more information, please visit: https://www.esol.com/

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