

María Engracia Gómez
Camino de Vera 46022 Valencia, Spain

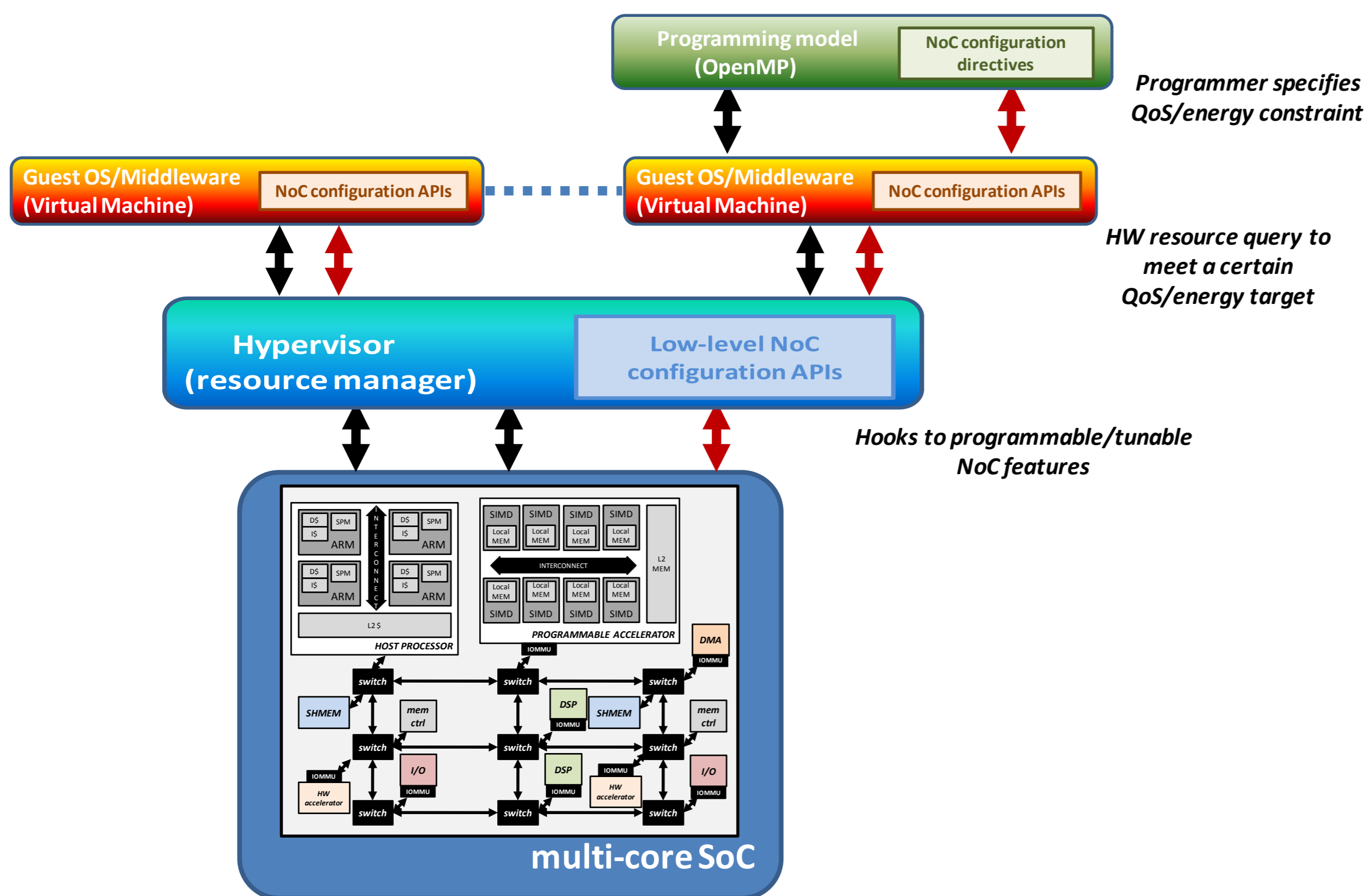
DISCA Universitat Politècnica de València
Tel: +34 96077007 Fax: +34 3877579

Key Innovation

Embedded devices are pervasive in our everyday life in e.g. cellular phones, set-top boxes and TV sets. Their hardware complexity is increasing exponentially and their flexibility is required to adapt them to a wide variety of applications. Virtualization, widely used in the general-purpose computing domain, allows an effective and clean way to isolate applications from hardware. However, virtualization on embedded systems is still in its infancy.

The vIrtical project will develop the virtualization concept in the embedded domain to manage and take advantage of the wide variety of hardware elements available in SoC multicore platforms, tackling different system layers (hardware, hypervisor, applications).

The vIrtical project will provide a set of hardware and software extensions that will allow improving SoC performance, programmability, QoS, reliability, security, power consumption, etc.



Technical approach

The Project will focus on heterogeneous multi-core processors and specific hardware accelerators since they allow the required computing power while exhibiting a good performance/watt ratio. The aim of the vIrtical project is to develop a platform efficient and flexible enough to be used in a wide variety of embedded applications taking advantage of the hardware components. These efficiency and flexibility could only be achieved using the virtualization concept, that is, totally decoupling applications from hardware.

However, virtualization on embedded systems requires particular approaches. The vIrtical project aims virtualization addressing the specific requirements for effective embedded virtualization. A virtualization-ready SoC platform and the associated programming models will be developed, tackling all the system layers: applications, programming model, hypervisor and hardware. This unique integrated approach will allow the heterogeneous multi-cores embedded systems to achieve the requirements relative to security and protection, QoS guarantees, reliability, power savings, programmability and memory coherency.

Demonstrator and Usage

The project will provide a set of software and hardware extensions that will allow to efficiently manage the hardware resources available in a SoC multicore platform improving programmability, QoS, reliability, security, power saving, etc. A virtual vertical SW-HW heterogeneous multicore platform that integrates the best methods and tools developed in the project will be provided and a physical demonstrator with some of methods and tools that will allow checking that the final platform achieves the requirements of virtualization and QoS pursued in the project.

Key Features

- Heterogeneous virtualization multi-core platform integrating virtualizable core ARM 15 and IOMMU combined with NoC.
- Openness (total decoupling from hardware to application software), security, programmability and performance of heterogeneous multicore embedded systems.
- New KVM open-source RELEASE. Increase of the European visibility in Virtualization and related Cloud Computing Systems.

Scientific, Economic and societal Impact

The presence of major European industrial players in the consortium will enable rapid commercialisation of the project outputs, enhancing European competitiveness. In particular, STM will take advantage of the virtualization of the NoC, IOMMU and memory for its platform, in collaboration with UPV and TEI. VOSYS will contribute to the development of an open source hypervisor for embedded devices. UNIBO will contribute to the enhancement of the OpenMP programming interface for embedded devices. ARM will provide key processors for embedded domain.

Universities will update educational materials based on new results and early involving young generation of European researchers. It is expected that the involved SMEs will significantly increase its revenue thanks to products based on the project results.

