MultiPARTES

Key Innovation

Nowadays it is often required to integrate multiple existing systems with assorted levels of criticality. This results in **growing complexity** of systems which makes the integration of dependability an issue in many domains leading to unacceptable development costs and time to market, especially for SMEs, also due to the price of the required tools.

The ability to combine previously independent system applications into a single computation platform is a major enabler for mixed-criticality. The goal is to save **cost** and the overall **reliability** since fewer wires and connectors are required. In some domains (e.g. space and automotive), the integration of mixed-criticality is becoming essential to **optimize weight, volume, and energy consumption**.

The main goal of the MultiPARTES is to support **mixed criticality for trusted embedded** systems based on **multicore open source virtualization**. This will be done through the definition, demonstration and validation of a complete methodology and tools. An average **30% effort reduction on the engineering** of mixed-criticality embedded systems is envisaged.

Technical Approach

The specific objectives are related to the different areas addressed by the project (see Figure):

- To develop an innovative multicore **open source** virtualization layer for trusted embedded systems.
- To define and benefit from hardware virtualization mechanisms for **homogenous and heterogeneous multicore** hardware platforms
- To devise a **methodology** for the rapid model-driven development and production.
- To **validate** the research results by engineering case studies.

Demonstration and Use

MultiPARTES results will be demonstrated by applications from **aerospace**, **offshore wind turbines**, **video surveillance, railway and automotive** - all of them **relevant sectors for the European** economy.
ALSTOM will use the MultiPARTES tools for the **integration of multiple existing and new systems with assorted levels of criticality**: the farm control, turbine control, yawing control, pitch control, and communications of a wind park development project.

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287702

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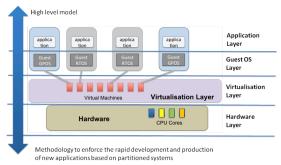**Community contribution to the project**
2.850.000 Euro

Project start date
01 09 2011

Duration
36 months

The MultiPARTES spatial and temporal isolation will enable Visual Tools to deploy **third-party applications** (e.g. navigation and mobile payment applications) into a single standard device without affecting the criticality of the video monitoring.

FentISS will engineer a software framework for **Time and Space Partitioning payload applications**. This is an open issue under development devoted to the space market. It

High level model

Methodology to enforce the rapid development and production of new applications based on partitioned systems

aims at reducing the effort for integration, verification and validation. The quality and maturity of the XtratuM hypervisor will be improved decreasing its weight and volume by 20% while increasing the performance by 60-80%.

IKERLAN-IK4 will develop a **railway** case study integrating in the same platform signalling and communications systems that were separated before. MultiPARTES tools and methodology will be used for engineering multiple systems with assorted criticality.

TRIALOG will combine safety related (such as emergency active break) with non-safety related **automotive applications** (such as infotainment).

Scientific, Economic and Societal Impact

ALSTOM expects that MultiPARTES results will generate an annual save of **300 K€ in hardware platforms** and **200 K€ in reduced engineering effort** – starting in 2017. EU citizens will benefit from greater production of green energy at lower costs – making the economy more sustainable in the long-term.

An innovative video monitoring product by Visual Tools will reduce the equipment on-board vehicles (police, bus, taxi). Visual Tools expects to grow steadily thanks to the MULTIPARTES based multi-market single device, and from reduced customisation efforts. Society will benefit from safer transportation by incorporating more functionality at lower costs.

FentISS expects to increase its turnover with the XtratuM hypervisor and TRIALOG with consulting services and MDE tools each by about 0.6M€ over the next 3 years which is significant for their competitive position as SME in the market.

Project partners	Country
IKERLAN-IK4	Spain
UP Valencia	Spain
TU Wien	Austria
UP Madrid	Spain
TRIALOG	France
FentISS	Spain
TELETEL	Greece
Visual Tools	Spain
ALSTOM Wind	Spain

Key features

- Drastically improved programmability of future parallel multicore/multichip computing systems

- Efficient and ubiquitous use of virtualization for heterogeneous multicore.

- Accelerated system development and production, enabling new products to be marketed with a considerably shorter time-to-market

- Reinforced European excellence in multicore computing architectures, system software and tools.

- Strengthened European leadership in cross-cutting technologies that are applicable to different market segments of computing systems and, in particular, European leadership in parallel computing systems for large data centres