# European research project promotes increased performance and reliability in the avionics industry

Over the next three years a European consortium will conduct research which may lead to safer and more energy efficient software systems in airplanes, cars and satellites

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Using probabilistic techniques to support timing analysis and safety certification in critical real-time embedded (CRTE) systems is the future, according to the partners behind the revolutionary research project called PROARTIS (**Pr**obabilistically **A**nalyzable **R**eal-**Ti**me **S**ystems). The new approach marks a radical break away from traditional techniques that may lead to significantly increased performance and reliability in CRTE systems while reducing overheads at the same time.

Backed by a budget of more than € 2.4 million, the PROARTIS Project is designed to demonstrate how a probabilistic approach to timing analysis will significantly improve system performance and timing analysis of new high performance hardware features and more complex critical real-time embedded software systems. This three-year project aspires to obtain research results that enable the use of complex processors in these types of systems, providing high performance in airplanes, cars and satellites and resulting in systems with more advanced safety and energy efficient features.

Using probabilistic analysis is expected to promote dramatic performance improvements in, for example, the avionics industry. The modern aircraft requires millions of lines of code just for on-board control functions such as guidance, navigation and control algorithms. Even in the most modest projections, a fourfold increase in performance will be required for on-board processors in next-generation aircraft. Existing hardware platforms may struggle to cope with these new demands.

Demonstrating why pathological timing cases in complex software used in avionics and elsewhere only arise with negligible probability will ultimately permit more widespread and effective use of probabilistic analysis techniques in system verification and certification. PROARTIS will show that new advanced hardware/software features enabling truly randomized timing behaviour can be used in CRTE systems.

Coordinated by the Barcelona Supercomputing Center, the PROARTIS Project brings together five top research centres such as the University of Padua (Italy), Institut National de Recherche en Informatique et Automatique (France) as well as industrial partners such as Rapita Systems (UK) and Airbus France (France). The project also collaborates with the University of Massachusetts Amherst (USA) and the University of York (UK).All partners have a recognised track record in the areas of expertise required to carry out the project. Moreover, the project includes strong participation from industry with an Industrial Advisory Board composed of key experts from University as well as Automotive, Space and Microprocessor industries and experts in Real-Time Operating Systems, Compilers and Software tools for CRTE systems.

"By proposing hardware and software that exhibit random timing characteristics, we will enable the use of probabilistic timing analysis techniques in Critical Real Time Embedded systems. We will show the benefits of our approach with the collaboration of key industrial partners", says Francisco J. Cazorla, Technical Manager of the PROARTIS Project and director of the Operating System/Computer Architecture group at the Barcelona Supercomputing Center.

For further information, visit the project website at www.proartis-project.eu or contact:

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