



# PaPP

*Developing Future-Proof Parallel Software*

## EXECUTIVE summary

The project aims at making **performance predictable for parallel applications on heterogeneous parallel platforms**. The whole system stack from architecture to application will be revisited and adapted for this purpose.

## RELEVANCE CALL 2009 objectives

The project addresses **complex multicore systems** and the results will be applicable to **multiple application domains**. The outcome will contribute to that European industry can deliver software with predictable and performance portability and reduced resource usage when moved from current platforms to future parallel platforms.

## MARKET innovation

Ensuring **portable and predictable performance** will significantly reduce cost for application providers that today have to deal with numerous hardware and OS platforms. SW developers will gain in flexibility, by not being bound to a particular hardware platform, thus increasing the competitiveness in an open market.

- > For the **Space application domain**, the results will be demonstrated on the commonly used satellite platforms, to verify a number of features already on going through European Space Agency.
- > In the **multimedia domain**, the results on performance portability will contribute to the reuse of important media processing IP on wider set of heterogeneous media processing chips.

## TECHNICAL innovation

The central approach for achieving predictability and performance portability is a **task-centric approach for parallel execution**. Task-centric run-time systems for homogeneous multicores have been shown to have attractive predictive properties which we believe can carry over to heterogeneous platforms as well. As opposed to data parallelism or explicit threading, application execution in this approach is structured as a graph of dynamically created tasks. Temporarily coexisting tasks can be executed in parallel by a number of native threads usually called workers. In this model, application developers can focus on application functionality determined by the task graph structure and individual task behaviour, while the **run-time system can optimize execution on a particular platform**. Furthermore, task graphs of application sub-components can be naturally composed for parallel execution, which might not be possible with e.g. threads due to resource exhaustion. One purpose of the project is to contribute to the task-centric approach and in particular to run-time systems and operating systems enabling dynamic software adaptation for **optimization of performance and resource utilization**, and **supporting heterogeneous multicore hardware** and different inter-core communication schemes.



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<b>INSTITUTION</b> Swedish Institute of Computer Science (SICS)	<b>DURATION</b> 36 months
<b>EMAIL</b> kost@sics.se	<b>TOTAL INVESTMENT</b> €9.5 M
<b>WEBSITE</b> www.papp-project.eu	<b>PARTICIPATING ORGANISATIONS</b> 15
	<b>NUMBER OF COUNTRIES</b> 7

