



CISTER

Research Centre in
Real-Time & Embedded
Computing Systems

Poster

Parallel Software Framework for Time-Critical many-core Systems

Project consortium

CISTER-TR-170120

Parallel Software Framework for Time-Critical many-core Systems

Project consortium

*CISTER Research Centre

Polytechnic Institute of Porto (ISEP-IPP)

Rua Dr. António Bernardino de Almeida, 431

4200-072 Porto

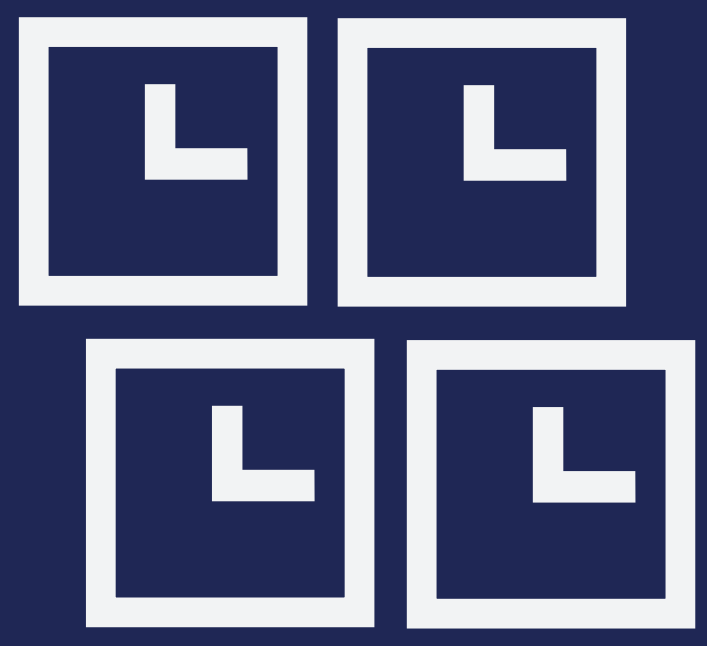
Portugal

Tel.: +351.22.8340509, Fax: +351.22.8321159

E-mail:

<http://www.cister.isep.ipp.pt>

Abstract

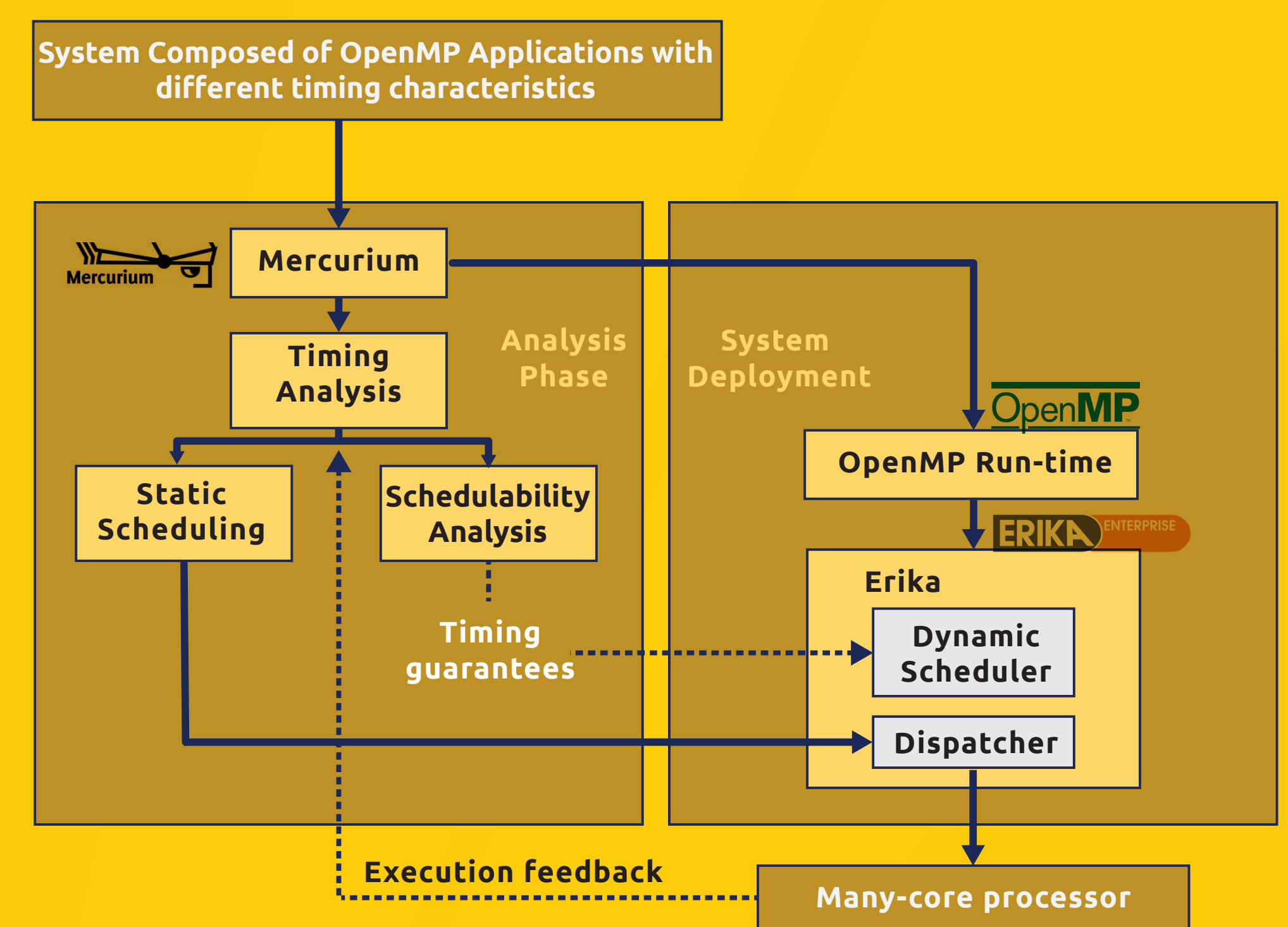


P-SOCRATES

Parallel Software Framework for Time-Critical many-core Systems

SOLUTION FOR SCALING PERFORMANCE IN EMBEDDED APPLICATIONS

- process big amounts of data from multiple data sources with guaranteed processing response times
- coping with the extra complexity of many-core hardware architectures
- reducing the complexity of parallel programming
- better performance with less effort



P-SOCRATES SDK

- Mercurium (source-to-source compiler)
 - » Analyses OpenMP applications and extracts parallel software components and data-flow and control-flow information
- Timing Analysis Tool
 - » Execution time upper bounds of each parallel component including impact of hardware interferences
- Scheduling algorithm
 - » Assigns parallel components of OpenMP applications to OS threads, respecting the timing properties of each application
 - » Assignment can be static, for systems requiring strong timing guarantees, or dynamic, for systems with more relaxed timing guarantees
- Schedulability analysis tool
 - » Efficiently determines the schedulability of a complex system composed of multiple OpenMP Applications
- Lightweight OpenMP run-time library
 - » Efficiently implements OpenMP4.5 functionality to fully exploit parallel opportunities while maintaining the timing guarantees derived by the timing and schedulability analysis
- Erika Operating System
 - » Implements light and efficient OS mechanisms supporting the time predictable parallel execution
 - » Assigns OS threads to cores respecting the timing guarantees derived by the timing and schedulability analysis
- Many-core architectures supported
 - » Kalray MPPA
 - » Texas Instrument Keystone II (partial)
 - » Potential to port to other platforms

Technical Approach

