Poster

Parallel Software Framework for Time-Critical many-core Systems

Project consortium

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Parallel Software Framework for Time-Critical many-core Systems

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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