2PARMA
PARallel PARadigms and Run-time MAnagement techniques for Many-core Architectures

Cyber-Physical Systems: Uplifting Europe's innovation capacity
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“Success stories of technology adoption”

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FP7-248716-2PARMA Project
List of Project Partners

1. Politecnico di Milano (POLIMI) – Italy (Coordinator)
2. STMicroelectronics (STM) – Italy / France
3. Fraunhofer Institut for Telecommunications / Heinrich-Hertz Institut (HHI) – Germany
4. Interuniversitair Micro-Electronica Centrum (IMEC) – Belgium
5. Institute of Communication and Computer Systems (ICCS) - Greece
6. RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (RWTH) - Germany
7. Synopsys (CoWare) - Belgium

EC contribution:
- 2.741.000 €

Duration:
- 1.01.2010-31.03.2013

Website:
- www.2parma.eu
Scientific and Technical Objectives

Main Goals

• Programmability of Many-core Computing Fabrics

• Design Space Exploration

• Runtime Adaptivity

Project Outcomes

• Integrated Compiler Toolchain and OS Layer

• Design toolset for HW/SW co-exploration

• Run-time Manager

The 2PARMA project focuses on the definition of suitable parallel programming models, run-time energy/power and resource management as well as design space exploration methodologies for Many-core Computing Fabrics.
Application adaptivity through Run-Time Monitor and Run-Time Resource Manager
Results summary

- Effective management of a platform with up to 64 cores
- Successful porting (availability) of design methodologies and associated toolset also on general purpose commercial architectures
- Efficient RTRM
  - Power saving greater than 10%, up to 5x energy improvement while ensuring QoS and soft-real time in multi-application scenarios
  - Stability and robustness of the RTRM with tunable overhead always below 10%
- Application prototypes and demos
- Already created one startup exploiting DMMLib

Exploitable Results (FOSS software)
- OpenCLang
- OpenCRun
- LLVM STM xp70
- BarbequeRTRM
- dmmlib
- DSE toolchain
- NoCTrace
- Nuclei Toolchains

Computing Fabric
- Device Driver
- BarbequeRTRM
- LLVM STMxp70

Exploitation Path
- Future Research on adaptivity and portability of parallelism
- P2012 SDK
- OpenCL 2.0 production compiler
- R&D roadmap
- Development of application library, use in products

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The way forward: next steps

- Enlarge participation to opensource projects (also thanks to new approved funded projects)
  - BBQ -> dependable performance and mixed criticalities
  - OpenCRun
  - LLVM
  - DMMLIB -> startup
- IMEC integrates 2PARMA results into product and research program offering to customers
- HHI applies know-how in SVC parallelization to development of HEVC decoder
- Support ST divisions in the utilization of STHORM and 2PARMA technologies
- Sustain STHORM ecosystem