SMECY: Smart Multicore Embedded [SY]stem

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Abstract

SMECY envisions that recently emerged multi-core technologies will rapidly develop to massively parallel computing environments which, due to improved performance, energy and cost properties, will extensively penetrate the embedded system industry in a few years. This will affect and shape the whole business landscape, e.g. semiconductor vendors need to be capable of offering advanced multi-core platforms to diverse application sectors, IP providers need to re-target existing and develop new solutions to be compatible with evolving multi-core platforms and the need of embedded system houses, in addition to product architecture adaptations and renewing their system, architecture, software and hardware development processes. The mission of SMECY is to develop new programming technologies enabling the exploitation of many (100s) core architectures. The goal of this ARTEMIS project is to launch an ambitious European initiative to match initiatives in Asia (e.g. teams funded by JST/CREST programmes) and USA (e.g. PARLAB in Berkeley, Parallel@illinois and Pervasive Parallelism Laboratory in Stanford) and to enable Europe to become the leader.
Context: Many-Core Architectures

- Trend for massively parallel computing environments
- Penetration of the embedded system industry
- Availability of powerful many-core architectures
- Applications more and more resources demanding
- Need for better ratio Computing Power per Watt

Application domains:

- Radar Signal Processing
  - Huge amount of data, intensive matrix computation
- Multimedia, Mobile and Wireless Transmission
  - Mobility, Energy management
- Stream processing (video surveillance)
  - Streaming, demanding algorithms

Organisation:

3 clusters
- Platform + domain
- To exploit specificities of platforms and application domains
- Cross fertilisation inter-clusters

UTIA Platform

- Heterogeneous multi-core network
- Batched and streaming data transfers
- Up to 2200 MB/s from DDR through 2x NPI

The mission of SMECY is to develop new programming technologies enabling the exploitation of many (100s) core architectures.

To provide tool chains optimized to

- Application domains
- Targeted platforms

The big picture

- Common architecture, APIs, and interoperable tools suites
- Heterogeneous multi-domain architectures.

Two level intermediate representation format

Central communication interface between the SMECY tools.

- one pragma based for the flexibility offered by this programming concept,
- another based on rich libraries calls, closer to the architecture entities.
- some SMECY tools, are responsible for ensuring the link between the two representations

Consortium: 27 partners, 9 countries

SMECY is an ambitious European initiative
grouping together tools providers,
silicon and platform designers and
partners developing applications
more and more resources demanding.