MACH

A further level of abstraction for a given application from the hardware is needed to be able to maintain such a software project over long period of time and many generations of hardware as well as developers.

The MACH project is targeting exactly this angle. With the introduction of domain specific embedded languages DSeL the specifics of the underlying hardware layers can be separated from the formulation of the general algorithms. The performance crucial parts are automatically mapped to the target hardware architecture by source-to-source compilers translating DSeL constructs into normal source code leveraging the existing development infrastructure such as high performance libraries optimized for the envisioned runtime environment, heterogeneous architecture interfaces (CUDA, OpenCL, ...) for making use of heterogeneous infrastructures and standard compilers for the classical CPU part.

TECHNOLOGICAL OR SCIENTIFIC INNOVATIONS

The MACH project is going to meet the challenge of performance portability and ease of programming across different heterogeneous hardware architectures within a given application domain. The MACH project is not going to target only usual HPC hardware but will especially put effort into combining both worlds: the world of traditional HPC and compute intensive embedded computing to form a kind of High Performance embedded Computing HPeC (sometimes also referred to as High Performance extreme Computing).

MACH is going to provide HPeC-application developers with tooling which allows them to code performance crucial parts of their applications in a maintainable, future-proof, and hardware independent manner by leveraging the potential of domain-specific embedded languages and high performance libraries.

STATUS - MAIN PROJECT OUTCOMES

The project is in its first year of execution.

For the moment, WP1 on requirements is being delivered. WP2,WP3, WP5 on use-case is started again with requirements and design deliverables. The MACH project is going to bridge the gap between traditional High Performance Computing and the need for high performance computing in the world of embedded computing. Furthermore, it will enable developers of HPC code to develop mission and performance critical applications independent of hardware constraints. By introducing Domain Specific Embedded languages, optimizing compilation frameworks, and libraries, the MACH project introduces a separation of concerns between domain algorithms and hardware-dependent implementation details.

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Research institutes, universities:
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PROJECT DATA

Coordinator:
FRAUNHOFER FOKUS

Call:
EUREKA ITEA2

Start date:
November 2013

Duration:
36 months

Global budget (M€):
14.6

Funding (M€):
2.1