1 History

Multicore programming shares many concepts with parallel and distributed computing. Multiple computing elements interact to accomplish a given task. In order to implement this programmers need basic capabilities for synchronizing the various threads of computation and coordinating accesses to resources. These problems have been solved for traditional distributed systems using various forms of middleware, and for multicore desktops and servers by facilities in Symmetric Multiprocessing (SMP) enabled operating systems.

As multicore computing extends into embedded domains many aspects of computing heterogeneity emerge. This limits the ability of programmers to utilize middleware designed for distributed systems, or to rely on an SMP operating system. These forms of heterogeneity include memory architectures, instruction sets, general purpose cores, special purpose cores (or hardware acceleration), and even operating systems. Yet multicore programmers still face the same programming challenges. Semantically there is little difference between this computing context and the distributed or SMP context. While it could be argued that existing standards for resource management would suffice in the embedded context if re-implemented, two more concerns serve as barriers to this approach: (1) the requirements of distributed systems and SMP systems demand overheads of footprint and execution times that are unnecessary in closely-coupled and reliable embedded systems, and (2) embedded systems have some significant additional requirements not encompassed by existing standards.

The Multicore Resource API (MRAPI) is designed to address these issues by embracing the proven features of existing standards, while explicitly supporting the heterogeneous embedded multicore computing context (including combinations of hardware or software heterogeneity, for example different kinds of cores and accelerators, or different operating systems). This API was developed under the guidance of the Multicore Association (MCA) with participation by many of the MCA member companies. Furthermore, the MRAPI specification is intentionally scoped to fit within the roadmap defined by the MCA. The first component of that roadmap was the Multicore Communications API (MCAPI). MRAPI and MCAPI share many concepts, constructs, and goals.