

A Clustering Framework for Task Partitioning Based on Function-level Data Usage Analysis

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Recently, reconfigurable computing has received a great deal of attention due to its ability to increase an application performance with hardware execution, while possessing the flexibility of software solution. One of the major requirements for such systems is to identify which application or part of the application can be implemented as software and which can be mapped onto reconfigurable devices. Grouping the tasks within an application can intensify coarse-grained partitioning of the application, which can eventually improve the performance of the system. In this work, we introduce a clustering framework along with a flexible multipurpose clustering algorithm that initiates task clustering at the functional level based on dynamic profiling information. The clustering framework can be used as the basic step to modify the granularity of tasks in the hardware/software partitioning and scheduling phases. As a result, an elaborate mapping onto the system resources and possibly a higher degree of task parallelism can be obtained. In an initial attempt, the framework addresses two primary objectives to create workload-balanced and loosely-coupled clusters. The experimental results show that the clustering complies with the desired metrics, which were defined through the objectives.

ACM Categories & Descriptors: C.3 SPECIAL-PURPOSE AND APPLICATION-BASED SYSTEMS, Real-time and embedded systems

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