

Parametric Analysis For Adaptive Computation Offloading

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ABSTRACT

Many programs can be invoked under different execution options, input parameters and data files. Such different execution contexts may lead to strikingly different execution paths. The optimal code generation may be sensitive to the execution paths. In this paper, we show how to use parametric program analysis to deal with this issue for the optimization problem of computation offloading.

Computation offloading has been shown to be an effective way to improve performance and energy saving on mobile devices. Optimal program partitioning for computation offloading depends on the tradeoff between the computation workload and the communication cost. Different execution paths may change the workload and communication requirements. Correct decisions on program partitioning must be made at run time when sufficient information about workload and communication requirements becomes available.

Our cost analysis obtains program computation and communication cost expressed as functions of run-time parameters, and our parametric partition algorithm finds the optimal program partitioning corresponding to different ranges of run-time parameters. At run time, we determine the optimal program partitioning to use according to the current values of run-time parameters. Experimental results on an HP IPAQ handheld device show that different run-time parameters can lead to quite different program partitioning decisions.

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