

Automatic Construction and Evaluation of Performance Skeletons

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The performance skeleton of an application is a short running program whose execution time in any scenario reflects the estimated execution time of the application it represents. Such a skeleton can be employed to quickly estimate the performance of a large application under existing network and node sharing. This paper presents a framework for automatic construction of performance skeletons of a specified execution time and evaluates their use in performance prediction with CPU and network sharing. The approach is based on capturing the execution behavior of an application and automatically generating a synthetic skeleton program that reflects that execution behavior. The paper demonstrates that performance skeletons running for a few seconds can predict the application execution time fairly accurately. Relationship of skeleton execution time, application characteristics, and nature of resource sharing, to accuracy of skeleton based performance prediction, is analyzed in detail. The goal of this research is accurate performance estimation in heterogeneous and shared computation environments.