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Performance Evaluation of Parallel Surface Modeling and Generation on Actual and Virtual Multicore Systems

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Abstract : Even though past, current and future trends suggest that multicore and cloud computing systems are increasingly prevalent/ubiquitous, this class of parallel systems is nonetheless underutilized, in general, and barely used for research on employing parallel Delaunay triangulation for parallel surface modeling and generation, in particular. The performances, of actual/physical and virtual/cloud multicore systems/machines, at executing various algorithms, which implement various parallelization strategies of the incremental insertion technique of the Delaunay triangulation algorithm, were evaluated. T-tests were run on the data collected, in order to determine whether various performance metrics differences (including execution time, speedup and efficiency) were statistically significant. Results show that the actual machine is approximately twice faster than the virtual machine at executing the same programs for the various parallelization strategies. Results, which furnish the scalability behaviors of the various parallelization strategies, also show that some of the differences between the performances of these systems, during different runs of the algorithms on the systems, were statistically significant. A few pseudo superlinear speedup results, which were computed from the raw data collected, are not true superlinear speedup values. These pseudo superlinear speedup values, which arise as a result of one way of computing speedups, disappear and give way to asymmetric speedups, which are the accurate kind of speedups that occur in the experiments performed.

Keywords : cloud computing systems, multicore systems, parallel Delaunay triangulation, parallel surface modeling and generation
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