

# An Effective Speedup Metric Considering I/O Constraint in Large-scale Parallel Computer Systems

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**Abstract**—With supercomputer system scaling up, the performance gap between compute and storage system increases dramatically. The traditional speedup only measures the performance of compute system. In this paper, we firstly propose the speedup metric taking into account the I/O constraint. The new metric unifies the computing and I/O performance, and evaluates practical speedup of parallel application under the limitation of I/O system. Furthermore, this paper classifies and analyzes existing parallel systems according to the proposed speedup metric, and makes suggestions on system design and application optimization. Based on the storage speedup, we also generalize these results into a general storage speedup by considering not only speedup but also costup. Finally, we provide the analysis of these new speedup metrics by case studies. The storage speedup reflects the degree of parallel application scalability affected by performance of storage system. The results indicate that the proposed speedups for parallel applications are effective metrics.

**Keyword**—storage speedup, general storage speedup, scalability, system classification



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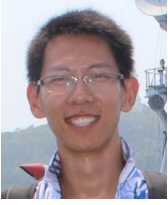
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