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Seeing the Forest for the Trees: Networked Workstations as a Parallel Processing Computer

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Unlike traditional "serial" processing computers in which one central processing unit performs one instruction at a time, parallel processing computers contain several processing units, thereby performing several instructions at once. Many of today's fastest supercomputers achieve their speed by employing thousands of processing elements working in parallel. Few institutions can afford these state-of-the-art parallel processors, but many already have the makings of a modest parallel processing system. Workstations on existing high-speed networks can be harnessed as nodes in a parallel processing environment, bringing the benefits of parallel processing to many. While such a system can not rival the industry's latest machines, many common tasks can be accelerated greatly by spreading the processing burden and exploiting idle network resources. We study several aspects of this approach, from algorithms to select nodes to speed gains in specific tasks. With ever-increasing volumes of astronomical data, it becomes all the more necessary to utilize our computing resources fully.