

PARALLEL COMPUTING USING LINUX CLUSTERS

PFRACT – A PARALLEL FRACTAL GENERATION PROGRAM

ABSTRACT

Parallel computing is a processing paradigm that involves exploiting the parallelism inherent in computer programs. The major goal is to improve the performance of computer systems by utilizing their processing capabilities so as to gain maximum throughput.

Cluster computing in Linux involves a collection of conventional Linux machines connected by a fast network interconnect, working in parallel in order to speed up the process of finding solutions to large, complex parallel computing problems. The many advantages offered by the Linux Operating System in terms of flexibility and reliability can be efficiently exploited to provide a full-fledged, off-the-shelf parallel computing platform.

This paper briefly traces the evolution of parallel computing paradigms and architectures before delving into the issues involved in developing parallel applications for Linux Clusters. The paper then elaborates on the development of a parallel computing application designed and implemented

by the authors, called PFract. PFract is a parallel fractal generation system, which speeds up the computationally intensive task of drawing fractal images. It parallelizes the fractal generation algorithm and executes it concurrently on a Linux Cluster. This parallel application is used as an example to elucidate the process of parallelization of conventional applications for execution on cluster architectures.

The authors have also developed a generic software architecture for deploying parallelized applications on clusters. The PFract system implements this architecture and has been used to test its capabilities compile performance statistics included in this paper.

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