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MATLAB : Parallel and Distributed Computing using CPUs and GPUs

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Abstract

MATLAB is a high level structured language and an interactive development environment for technical computing and algorithm development. It has enabled scientists and engineers to efficiently process and analyze data, develop and deploy algorithms and applications. Furthermore, Parallel and Distributed Computing capabilities in MATLAB, allow users to solve computationally and data intensive problems by taking advantage of the latest multiprocessing systems: multicore desktops, computer clusters, GPUs, grid and cloud computing services. It is now possible to interactively prototype and develop distributed and parallel applications, briefly touch upon the parallel data structures, such as distributed arrays, and programming constructs such as parallel for loops, parallel numeric algorithms and message passing functions. Using typical numerical computing problems as examples, this workshop describes how to use MATLAB parallel tools to take full advantage of the performance enhancements offered by multicore / multiprocessor computing environments. In addition, you will learn how you can leverage the computing power of NVIDIA CUDA-enabled GPUs to accelerate your MATLAB applications with minimal programming effort using GPU arrays and GPU enabled MATLAB functions. Sample codes, differences in CPU and GPU implementations as well as benchmark results for some typical numerical computing problems will be presented.