

Distributed and Parallel Computing by The MathWorks SAS

The MathWorks Distributed Computing Toolbox 3 represents a major breakthrough for parallel algorithm development by enabling engineers and scientists to prototype and develop parallel algorithms in MATLAB® interactively and without the need to program message passing. This streamlined workflow avoids the inefficiencies of parallel computing methods that involve low-level programming with languages such as FORTRAN or C and libraries such as the Message Passing Interface (MPI). Researchers using Distributed Computing Toolbox 3 to distribute their calculations across multiple processors can tackle more computationally and data-intensive problems faster than previously possible.

Today's engineers and scientists, faced with the demand to model increasingly complex systems in less time, are pursuing parallel solutions in high-performance computing (HPC) distributed environments made out of commercial off-the-shelf (COTS) multiprocessor, multicore computers. To take advantage of these distributed environments, however, they must keep track of message passing details such as synchronizing data between processors and managing interprocessor communications, effort that competes with their research activities.

Distributed Computing Toolbox 3 simplifies the development of parallel applications in two significant ways. First, the toolbox supports a parallel programming model known as global array semantics, which treats related data distributed across processors as a single distributed array rather than as independent arrays on different processors. Through distributed arrays, researchers can perform operations directly on arrays without having to manage the tedious details of message passing. The toolbox provides more than 150 MATLAB functions for distributed arrays, including linear algebra routines based on ScaLAPACK. "Engineers and scientists who lack programming expertise can now take advantage of distributed arrays and easily convert a serial MATLAB program to a parallel one," explained Silvina Grad-Freilich, product manager for distributed computing and application deployment products at The MathWorks.

Second, the toolbox includes a new interactive parallel mode of execution so that researchers can work interactively with a parallel job running simultaneously on several processors or cores. This mode facilitates iterative exploration, design development, and problem solving.

"I'm excited by the new parallel computing capabilities in MATLAB," said Robert Schreiber, Distinguished Technologist at HP Laboratories. "By reducing the complexity of parallel computing, The MathWorks makes parallelism more accessible to application programmers creating technical computing applications."