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PARALLEL COMPUTING WITH MPI / MPICH CLUSTER NETWORK

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Abstract

The work aims to speed up the performance of processing using parallel computing. Parallel computing is being used in many organizations using Open/Mpi. In our work we used Mpi/Mpich after modifying of using new algorithm to improve its performance. Real-time was measured computing the modified Mpi/Mpich and the advanced Mpi/Mpich

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Introduction

Package MPI/MPICH has been used widely in the parallel computing .There are more than one package used to make the parallel computing such as Openmpi , cluster matic , MPI/MPICH,..etc. The best of packages in the MPI/MPICH, as it is easy to deal with programming language like C language in terms of connection [3].

Independence of Distributed Memory Processors

In computing systems with distributed memory, processors operate independently of each other. Parallel computations in such circumstances, must be able to distribute the computational load and organize interaction (data transmission) between processors [1].

Providing a data interface (message passing interface - MPI).

Under MPI which adopted a simpler approach, to solve this problem it is important to develop a program which should be the only program running at the same time on all available processors. To avoid identity calculations on different processors, we can, firstly, substitute different data for the program on different processors, and secondly, use available means in the MPI to identify the processor that runs the program, (thereby giving the opportunity to organize the differences in the calculations depending on the program of the processor).

Such a method of organization of parallel computing has the model name (single program multiple processes, SPMP). For the organization of information exchange between processors in the most minimal variant enough operations transmit and receive data (in this case, of course, there must be a technical possibility of communication between the processors - channels or communication lines).

In MPI there are a whole set of data transfer operations.

Explaining Mpi and Mpich and Differentiated With Them

MPI is message passing interface and is used as directive while writing parallel programs in programming language. MPICH is a library including functions of parallel computing and is uploaded on computer. While writing parallel program, we must operate the library MPICH and we input the directive MPI in code program. Application parallel programs in local network, parallel program are applied on number of computer where each computer consists of more than one processor.

Ways of Data Transfer By Mpi In Parallel Computing In Cluster Network

They provide different ways of data transfer. That these features are the strong points of MPI (t in particular, testifies to the very name of MPI).

MPI would greatly alleviate the problem of portability of parallel programs among different computer systems - a parallel

program, developed in C or FORTRAN algorithm languages, using MPI library, as a rule, will run on different computing platforms. MPI improves the efficiency of parallel computing, as it is now virtually every type of computer systems, there are libraries implementing MPI, to the maximum extent that they take into account the possibility of computer equipment.

MPI reduces, in some respects, the complexity of parallel program development, since, on the one hand, most of the considered methods of data transmission provide standard MPI, and on the other hand, already have a large number of libraries of parallel methods which were created by using MPI[3].

To explain what is meant by MPI? First, MPI - is a standard that must satisfy a means of organizing the transfer of messages. Secondly, MPI -is a software tool that enables transmission of messages that meet all the requirements of the standard MPI. Thus, according to the standard, these tools should be organized in a library of software functions (libraries MPI) and should be accessible to the most widely used algorithmic languages C and FORTRAN. Such «duality» MPI should be considered when using terminology. Typically, the acronym MPI is used when referring to the standard and a combination of «library MPI» indicates a particular software implementation of the standard. The notation used for MPI libraries MPI, and for the correct interpretation

of the term should take into account the context.

Consider the number of concepts and definitions that are fundamental to the standard MPI.

Under a parallel program MPI there are set of concurrent processes. Processes can run on different processors, but a single processor can be located and some processes (in this case response can be implemented in time-sharing mode). In the limiting case for the execution of a parallel program can be used by one processor - as a rule, this method is used for initial validation of parallel programs.

Each process of a parallel program is generated based on a copy of the same software package (SPMP model). This code, presented in the form of an executable program, must be available at the time of running the parallel program on every processor. The source code for the executable program is developed on C or FORTRAN algorithms with some implementation of MPI library.

The number of processes and that of processors are determined at time of running a program by means of a parallel program executing MPI-programs. In the course of calculations these numbers cannot be changed without the use of special, but rarely personnel involved means that the dynamic generation of processes and management has appeared in the MPI standard version 2.0. All processes of the program are sequentially numbered from 0 to p-1, where p

is the total number of processes. The process number is called the rank of the process.

The implementation of MPICH allocates a specified number of processes among the available computing nodes without considering the constraints of available resources to them. Additionally, MPICH does not include information structure assignments and the heterogeneity of its component tasks, which leads to potential loss of productivity. Therefore, in computer clusters, MPICH uses such software, such as scheduler and resource managers. But here we must bear in mind that these applications are usually used for a wide range of tasks, and they cannot take into account the specific features of various problems arising from the solutions of the compound assignment.

We conclude that this package has a problem while comparing it with other packages such as absence of execution order control, resource allocation between processors, and status information task in the queue.

Conclusions

This package provide us with parallel computing in cluster network to increase the performance speed so we can do without a lot of processors, but this package has disadvantages such as absence of execution order control , resource allocation between

processors , status information task in the queue.

References

- [1] Hockney, R. W., & Jesshope, C. R. (1988). *Parallel Computers 2: architecture, programming and algorithms (Vol. 2)*. CRC Press.
- [2] Lifka, D. A. (1995, January). The anl/ibm sp scheduling system. In *Job Scheduling Strategies for Parallel Processing* (pp. 295-303). Springer Berlin Heidelberg.
- [3] Ward Jr, W. A., Mahood, C. L., & West, J. E. (2002). Scheduling jobs on parallel systems using a relaxed backfill strategy. In *Job Scheduling Strategies for Parallel Processing* (88-102). Springer Berlin Heidelberg