International Journal of Advances inEngineeringResearch

http://www.ijaer.com

(IJAER) 2012, Vol. No. 4, Issue No.I,July **ISSN:2231-5152**

PARALLEL COMPUTING USE AND THEIR APPLICATION

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ABSTRACT

Parallel Computing is the simultaneous use of multiple computer resources to solve a problem. The computer resources might be a single computer with multiple processors (SIMD Computer), an arbitrary number of computers connected by a network and combination of both. It is used in various fields like in Science, Engineering, Industrial and Commercial.

Parallel Computing has its own "jargon". Some of the more commonly used terms associated with parallel computing are Supercomputing, High Performance Computing (HPC), Node, CPU, Socket, Processor etc..

But we discuss here why we use parallel computing. With the use of parallel computing we have various advantages like save time and/or money, Solve larger problems, Provide concurrency and Use of non-local resources

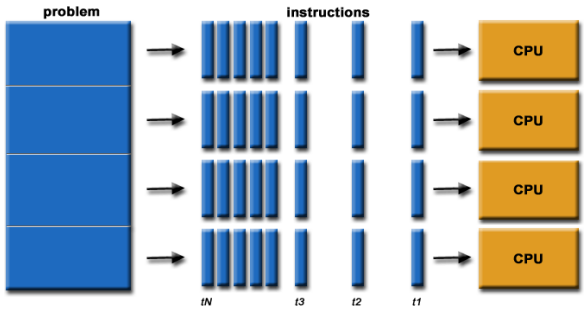
After 2 or 3 years, the trends indicated by ever faster networks, distributed systems, and multi-processor computer architectures clearly show that parallelism is the future of computing.

Key words:

Parallel Computing, SIMD, Jargon, HPC, Parallelism.

INTRODUCTION

Parallel Computing is the simultaneous use of multiple computer resources to solve a problem[1] or in other words Parallel Computing is a form of computation in which many calculations are carried out simultaneously operating on the principle that large problems can often be divided into smaller ones, which are then solved concurrently [2]. There are several different forms of parallel computing: bit-level,instruction level,data, and task parallelism. Parallel computing has become the dominant paradigm in computer architecture, mainly in the form of multicore processors.



TYPES OF PARALLEL COMPUTING

Bit-level Parallelism

Bit-level parallelism is a form of parallel computing based on increasing processor word size. Fromthe advent of very-large-scale integration (VLSI) computer chip fabrication technology in the 1970s until about 1986, advancements in computer architecture were done by increasing bit-level parallelism.

Instruction-level Parallelism (ILP)

Instruction-level parallelism (ILP) is a measure of how many of the operations in a computerprogram can be performed simultaneously. The potential overlap among instructions is called instruction level parallelism. There are two approaches to instruction level parallelism: Hardwareand Software.

Data Parallelism

It is also known as loop-level parallelism is a form of parallelization of computing across multiple processors in parallel computing environments. Data parallelism focuses on distributing the data across different parallel computing nodes. It contrasts to task parallelism as another form of parallelism.

TaskParallelism

It is also known as function parallelism and control parallelism is a form of parallelization of computer code across multiple processors in parallel computing environments. Task parallelism focuses on distributing execution processes (threads) across different parallel computing nodes. It contrasts to dataparallelism as another form of parallelism.

USES OF PARALLEL COMPUTING

Parallel computing uses in varios field of scientific, engineering, industrial and commercial. Parallel computing has been considered to be "the high end of computing", and has been used to model difficult

problems in many areas of science and engineering. But the first question come in mind Why we use parallel computing ?

Save Time and Money

It decrease the completion time, with potential cost savings. Parallel computers can be built from cheap, commoditycomponents.

Solve larger problems

There are number of problem which is very large and/or complex as well as time consuming if we solve those problems. It is impractical or impossible to solve them on a single computer, especially given limited computer memory then these problems are solved using parallel computing. Eg. SEO, Web SearchEngine

Provide Concurrency and Consistency

Single compute resource can only do one thing at a time. Multiple computing resources can be doing many things simultaneously. Eg. Supercomputer

APPLICATION OF PARALLEL COMPUTING

Today, commercial applications provide an equal or greater driving force in the development of faster computers. These applications require the processing of large amounts of data in sophisticated ways. We can use parallel computing in various fields like:

1. Databases, datamining.
2. Web search engines, web based businessservices.
3. Medical imaging anddiagnosis.
4. Financial and economicmodelling.
5. Advanced graphics and virtual reality, particularly in the entertainmentindustry.
6. Networked video and multi-mediatechnologies.
7. Collaborative workenvironments.
8. Oil exploration.
9. Management of national and multi-nationalcorporations.
10. Pharmaceuticaldesign
11. Web search engines, web based businessservices

12. Atmosphere, Earth,Environment
13. Physics - applied, nuclear, particle, condensed matter, high pressure, fusion,photonics
14. Bioscience, Biotechnology,Genetics
15. Chemistry, MolecularSciences
16. Geology,Seismology
17. Electrical Engineering, Circuit Design,Microelectronics
18. Computer Science,Mathematics

DISADVANTAGES OF PARALLEL COMPUTING

Transmission Speed

Transmission speed is relatively low as depends upon, how fast data can move through hardware. Transmission media limitations such as (limit of copper wire 9cm/nanosecond) make data transmission low.

Difficult Programming

It is difficult to write Algorithms and computer programs supporting parallel computing as, it requires integration of complex instructions. Only people with enough knowledge can code program well.

Communication andSynchronization

Communication and synchronization between the sub tasks are typically one of the greatest obstaclesto get good parallel programperformance.

FUTURE OF PARALLEL COMPUTING

It is expected to lead to other major changes in the industry. Major companies like INTEL Corp and AdvancedMicroDevicesInchasalreadyintegratedfourprocessorsinasinglechip.Parallelcomputing may change the way computer work in the future. After 2 or 3 years, the trends indicated by ever faster networks, distributed systems, and multi-processor computer architectures clearly show that *parallelism is the future ofcomputing.*

REFERENCES

[1] https://computing.llnl.gov/tutorials/parallel_comp/#Whatis

[2]http://www.mhpcc.edu/training/workshop/parallel_intro/MAIN.html#

[3] http://en.wikipedia.org/wiki/Parallel_computing

[4]http://www.wifinotes.com/computer-networks/what-is-parallel-computing.html#.UH_G7cGMor4[5]http://rcc.its.psu.edu/.../Introductionto**ParallelProgramming**Co... - UnitedStates

[6] http://dl.acm.org/citation.cfm?id=1138989