Multi-core with ht technology to solve data lake complex problems

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Abstract. Technology is taking its lead towards growth and it should be timely used properly for complex problems. Everything is available with us and it should be planned properly for better technology and its usage. This paper deals with core technology that will save time and cost for high resolution images. Which are used for movies, virtual games and simulations? Multi-cores are not new to the society; they are taken their shape into different transitions. Now we are in dual core technology with more processors and speed. We can utilize the cores properly if we have software technology. Main objective of this paper is to utilize cores proper for specific work with interrelating them. Finally they have to be organized properly with governance of the software. For performance HT Technology is used to select core for specific job. By selecting different cores we can gain performance, same way increase the speed and high resolution of images.

1. Introduction
Technology is growing rapidly with lot of changes in them. Now we are in advanced technology with sophisticated resources. Computer system have coordination with the others devices and maintain them. One of critical area in computer system is the CPU or processor. There are lot improvements in the processor technology. We know single core processor, multiprocessor and now are in stage of multi-processor/multi-core as shown figure 1.

![Three system configurations](image)

Figure. 1. Three system configurations.

Image processing is the study of analysis and manipulation of digital image. Image is a representation of the thing or a person or an art related to existing or non-existing thing. When image is computerized
it is said to be as digital image. Digital image means which is represented within binary form. It can be two dimensional or more dimensional images. Digital image can be raster or vector images. Anybody can use any type of images. It depend upon requirement. Various files cover under raster are jpg, gif, png, tif and under vector ai, eps, pdf, svg. These are the extensions of the files.

2. Existing System

History of computers is long and it has its own milestones and it will give good and better systems to the world in coming days. Our journey started with single cores to now dual core processors. Processors play a key role in computer systems as shown in figure 1. This processor accommodate with various speeds. Now the speed range is in GHz. We have seen various stages of improvements in processor technology. Single core processor can perform less than multiple processors. Now we are in a technology where we can have processor on one chip die. This is most power achievement in processor technology. We have seen various stages of improvements in processor technology. Single core processor can perform less than multiple processors. Now we are in a technology where we can have processor on one chip die. This is most power achievement in processor technology. Main origin for processor technology is a model proposed in a parallel processing Main origin for processor technology is a model proposed in a parallel processing technology. By using multi-cores we can increase performance by giving good frequency, ILP, power and memory for image processing. Till now we have used parallel processing for images, background music in movies. From new era onwards we can use multi-core technology for making of good quality movies, virtual games and training simulations.

3. Literature Survey

Xuanxia Yao et.al, author spells the widespread use of multi-core processors and task scheduling algorithm for multi-core processors. Still there are some drawbacks related to low utilization of processor rate, high complexity. Paper focuses on presenting a task scheduling algorithm for multi-core processors, which as basics related on priority queue and task duplication. But do not focus on HT Technology using multi-cores.

Jie Chan et.al, author focuses on multi-core processors based commodity servers recently become building blocks for high performance computing Linux clusters. Author also reveals OpenMP implementations that provide high performance. But no focuses on HT Technology.

Pawel Gepner et.al, author focuses on multi-core processors which set trends in history of processors with HPC. Intel Corporation is related to processor from a long period onwards. Intel Corporation have contributed lot to the development of hardware-enhanced threading capabilities. This paper focus on how far we can meet some of the challenges we are facing with multi-core processors.

Myung-Jin Baek et.al, author focuses on KOMPSAT which has three-processor distributed multi-cores spacecraft system. These three on-board processors are interfaced through a MIL-STD-1553B data bus for basic communication and good data transfer. This paper focus on a technique to synchronize and initialize three processors; communication and data handling management of the 1553B data bus; and the onboard fault and recovery management technique and spells the difficulties in using multiple-processor systems. No focus on HT Technology using multi-cores.

Hiroshi Inoue et.al, author focuses on modern high-performance processors support multiple hardware threads in the form of multiple cores and SMT. Author does not focus on HT Technology.

Diogo Marques et.al, paper focuses on the contemporary processor architectures with the aim to increase their attainable performance and speed, such as increased number of cores (multiple cores), improved capability of memory subsystem and enhancements in the processor pipeline. No focuses on multi-threads and software related to issues.

Daniel S Bernstein et.al, Author focuses on algorithms which offer a tradeoff between computation time and the quality of the result returned. Author acknowledges that the difference of performance in single processor and multiple processors with acceleration ratio between them. Paper focuses on schedule for mprocessors and proves that it is optimal for all m. No focus on multi-threads and software related to multi-cores.
Khaled M Attia et.al, Author focuses on Multi-core processors and power management to increase maximize performance within a given power budget. No focus on the HT Technology related to execution of large datasets.

Thomas Mezmur Birhanu et.al, paper focuses on a thread scheduling mechanism primed for heterogeneously configured with multi-core systems. Approach considers CPU utilization for mapping running threads with the appropriate core that can produce the actual needed capacity. Author introduces a mapping algorithm that is able to map threads to cores in a time complexity. Author focuses on number of cores and is the number of types of cores. Author introduces a method of profiling heterogeneous architectures based on the discrepancy between the performances of individual cores. Author focuses on performance and speed, no focus on multiple threads.

Francesco Fusco et.al, author focuses on multi-core systems and computer processors. Spells how the network and multi-core architectures does not sink with unnecessary memory copies operating system layers. Because of these issues the performance may be affected very badly. This paper focuses on common pitfalls of network monitoring applications and issues to solve those using multi-cores. No focus on execution of large datasets.

Kuntam Babu Rao et.al, author focuses on uniprocessor and multi-core processors in parallel processing. Parallel processing is related to multiple processors. The code is executed on single processor, multiple processors and multi-cores processors. When we go to multiple processors and multi-core processors increase speed and performance. When code is divided into slices and is handover to each processor. Each processor will execute the piece of code accurate when they do not share common variable. Author focuses on shared memory with snoopy cache to increase performance in parallel processing. No focus on how they are executed and other issues.

Kuntam Babu Rao, paper focus on huge data (i.e., Large Datasets) and how it is related to memory. When it is stored in memory that means it should be retrieved, stored, modified, updated and search for data. When we perform on normal data tables it is easy to access them. In today's world we all depend upon data. Data is huge and should be access accurately. Author uses data mining techniques for calculating large datasets. When we use single core processors the performance and speed will reduce, so to increase performance and speed author focuses on MCC model and which is spelled as Multi-core chamber for executing large datasets, but no focus on how they are executed. By using multi-cores we can gain lot of performance and speed. Experts need not wait for hours

4. Literature Survey
Now a days the chipset contains multi-cores, more than one processor in there chipset. Obviously speed can be affected by multi-cores. The problem is how we can engage them efficiently. We can make use of each processor for different usage in complex systems. It can be medical scan or surgery, airplane, weather forecasting, virtual scenarios, video games, image processing, and so on. It can be anything or field or system can be managed efficiently with multi-cores. We can have one (single), two (dual), four (quad), 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536 core processors and quad core processor is shown in below figure 2.
There are three different options to choose in using multi-core processors.

- No Action
- Multi-task
- Multi-thread(s)

No Action maintain the same old story with no accommodate multi-core processors. This option will rise minimal performance because the code will not take advantage of the multiple cores.

The second option is to multi-tasking. Multi-tasking is the ability to run multiple processes at the same period. Code is divided into small parts and assigned each part to each processor. Partition is based on number of processors and SLoC.

The third option is to multi-thread your application. Multi-threading is one of the main routes to acquiring the performance benefits of multi-core processors. CPU or a single processor in multi-core processors to execute multiple processes or threads concurrently is called multithreading. A thread is a single line of commands that are getting processed; it can contain more than one line of command. Each application can have more than one thread.

Concurrency in software is a way to manage the sharing of resources used at the same time. As computer architecture could adopt a thread-level parallelism, so many times it is recognized that modern processors were underutilized. A thread can treated as a basic unit of CPU utilization.

Multi-core is a reality now, software professionals can use this advanced technology in many ways based on requirements. Multi-core architectures can be homogeneous or heterogeneous. Homogeneous means all cores are of same type, whereas heterogeneous means one core is different from others. Heterogeneous are used in computer graphics. They are of different cores or independent cores and can work over same project. Figure 3 and 4 are related multi-core and hyper-threading technology.
HT Technology achieves performance gains through latency hiding. With HT Technology, in certain applications, it is possible to attain, on average, a 35 percent increase in processor throughput and in special cases 1.5 times more. Performance calculation purpose ratio is given below

\[ \text{Speedup}(n_t) = \frac{\text{Time}_{\text{best \_ sequential \_ algorithm}}}{\text{Time}_{\text{parallel \_ implementation}(n_t)}} \] (1)

Speedup is defined in terms of the number of physical threads \((n_t)\) used in the parallel implementation. Amdahl stated speedup of the fraction.

\[ \text{Speedup} = \frac{1}{(1 - \text{Fraction}_{\text{enhanced}}) + (\text{Fraction}_{\text{enhanced}}/\text{Speedup}_{\text{enhanced}})} \] (2)

Speed up half the program by 17 percent, then

\[ \text{Speedup} = 1/((1 - .50) + (.50/1.15)) = 1/(.50 + .43) = 1.08 \] (3)

Above given equations increase result speed by 9 percent. If 50 percent of the program is upgraded to 17 percent then the 100 percent of the program is improved by 50 percent of that amount. To understand threading for any of your application, then follow the steps: the inception architecture of your application, (2) the threading API, (3) the compiler for your application and (4) the target machine to run. Based on HT technology we can write different programs and coordinate them for
speed and fast results. We can assign different jobs or processes to threads; they will be in that assigned work till status is closed. We can assign threads to single different processors and coordinate them for merge any data.

Figure 5 gives the single core technology and figure 6 gives the multi-core technology with memory matrix. Memory matrix of 3X3 size, it can vary based on the requirements of the software professionals.
5. Implementation

5.1. Model

![Multi-core Processors to produce high resolution image](image)

Figure 7. Multi-core Processors to produce high resolution image

Figure 7 is a model that produce high resolution image. Model contain matrix memory buffer with 3X3 and there is not limitations on matrix form. It depends upon the memory that is available on the system. Model is based on 4 cores and they are distributed on memory buffer. They are executed in a sequential form or any other algorithm based model. Assign what core should do in the memory and display the output on monitor.

5.2. Algorithm

The Step 1:

\[ Memory_{buffer1} = i1; i2; i3; \ldots; in \]  \hspace{1cm} (4)

Prepare memory other buffers based on requirements, each memory buffer contain instructions from 1 to n.

Step 2:

\[ Core_k \leftarrow Memory_{buffer1} \] \hspace{1cm} (5)

Assign memory buffer to the core, based on algorithm or software they can be assigned. Simultaneously we can run the cores to form high resolution image.

Step 3:

\[ Image_{color1} \leftarrow Core_k \] \hspace{1cm} (6)
Each core can be assigned one or more image colors to draw. All colors are merged on a form to high resolution image as shown in figure 8. These images can be made or run to form visual scenarios, computer games or training simulation.

![Image of core assignment](image)

Figure 8. High resolution images

6. Test results
Multi-core is reality now, previously the multi-cores are models only. We have different multi-core chip dies from various companies like INTEL, IBM and AMD. The test results are also good when compared with low version chip sets. Figure 9 gives the speed with code on cores.

![Speed graph on multi-cores](image)

Figure 9. Speed graph on multi-cores
Figure 10 gives the high quality image when compared with image run on single core processor. When we speak high resolution means it contains more pixels, more pixels means the dot area of the image. More dots more clarity. We can use multi-core in medical side for good results.

7. Acknowledgement

We are well versed with core technology and advanced technology is dual core technology where we can have pairs of processors. According to cost point of view they are not too much expensive, normal people can afford it. In future we may get more cores under low cost. We are advancing in technology but poor in software. Managing software is also a complex task. Multi-core technology is like that it can be easily used in between hardware and software. If both technologies have coordination between them, we solve so many problems. In this paper we focus on HT Technology with turbo boost technology to select cores. Threads are coordinated with the processes or jobs to solve large problems. We can give good clarity towards images. We can solve so many medical problems in future. This paper focuses on high resolution images where they are related to image processing. Based on image processing techniques we can design good computer games, visual scenarios and training based simulations. We can use to solve complex problems. This will give good results in performance point of view and speed point of view

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