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Theory Assignment-1 (PP)

Q1 Discuss application of High Performance computing, at least three different domains?

Ans The application of High performance atleast three different domains are as follows:

i) ~~Healthcare~~ Research labs: medicines and computing are interrupted High performance computing is used to help scientists find sources of renewable energy, understand evolution of our universe, predict and track storms and create new materials.

ii) Media and Entertainment: High performance computing is used to edit feature films, render mind-blowing special effect and stream live events around the world.

iii) financial services: High performance computing is used to track real-time stock trends and automate trading.

iv) Oil and gas: High performance computing is used to more accurately identify where to drill for new wells and to help boost production from existing wells.

Q2 Explain the Dichotomy of parallel computing platforms.

Ans A dichotomy is based on logical and physical appearance of parallel platforms. The logical organization refers to a programmer's view of the platform while physical organization refers to the actual hardware organization of platform. Two critical components of parallel computing from a programmer perspectives are ways of expressing parallel tasks (control structure) and mechanism for specifying interaction between these tasks.

① Control structure of Parallel platforms.

→ Each program in a set of programs can be viewed as one parallel task.

→ Individual instructions within a program can be viewed as parallel tasks.

② Communication model of Parallel platforms.

There are two primary forms of data exchange between parallel tasks — accessing a shared data space and exchanging messages.

Q3 Explain Mapping Techniques and Parallel Programming Models.

Ans → Static Mapping distribute tasks among processes prior to the execution of algorithm. Dynamic mapping distribute work among processes during execution of algorithm. Dynamic mapping apply to.

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→ Parallel programming introduces additional sources of complexity: if we were to program at lowest level, not only would number of instructions executed increase, but we would also need to manage explicitly execution of thousands of processors and coordinate millions of interprocessor interactions. Hence, abstraction and modularity are atleast as important as in sequential programming.

Q4 Explore if bubble sort can be parallely implemented? If not write report in detail and modification if needed?

Ans Parallel bubble sort is a parallel implementation of the classic Bubble sort algorithm. Concept of parallelism involves executing a set of instructions simultaneously instead of line by line sequentially. main benefit of this is faster computation.

In parallel bubble sort, we divide sorting of unsorted into two phases — odd and even.

When it is odd phase, we compare element at index 0 and so on. In even phase, we compare index 1 element with index 2 element, and so on.

In case of multi-core processors, both phases can occur simultaneously, which is known as parallel implementation.