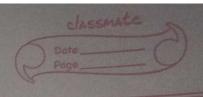
Performance pitally - Page 4) Various clauser ort Open MP for loops (Page 7-8 of Date Scoping (Page-6) Feidization VS False Sharing



HPC

Unit-4

Open MP: - (Open Source Multi-Processing)

Open MP is an application programming Integral (API) that supports multi-platform shared memory multiprocessing programming in C, C++ and Fortran.

It is used for multithreading (to get maximum performance we use multithread concept with open MP).

So, OpenMP is a set of compiler directives as well as an API for programs written in C, C++ or FORTRAIN. that provides support for parallel programming in shared memory environments.

* # include < omp · h>

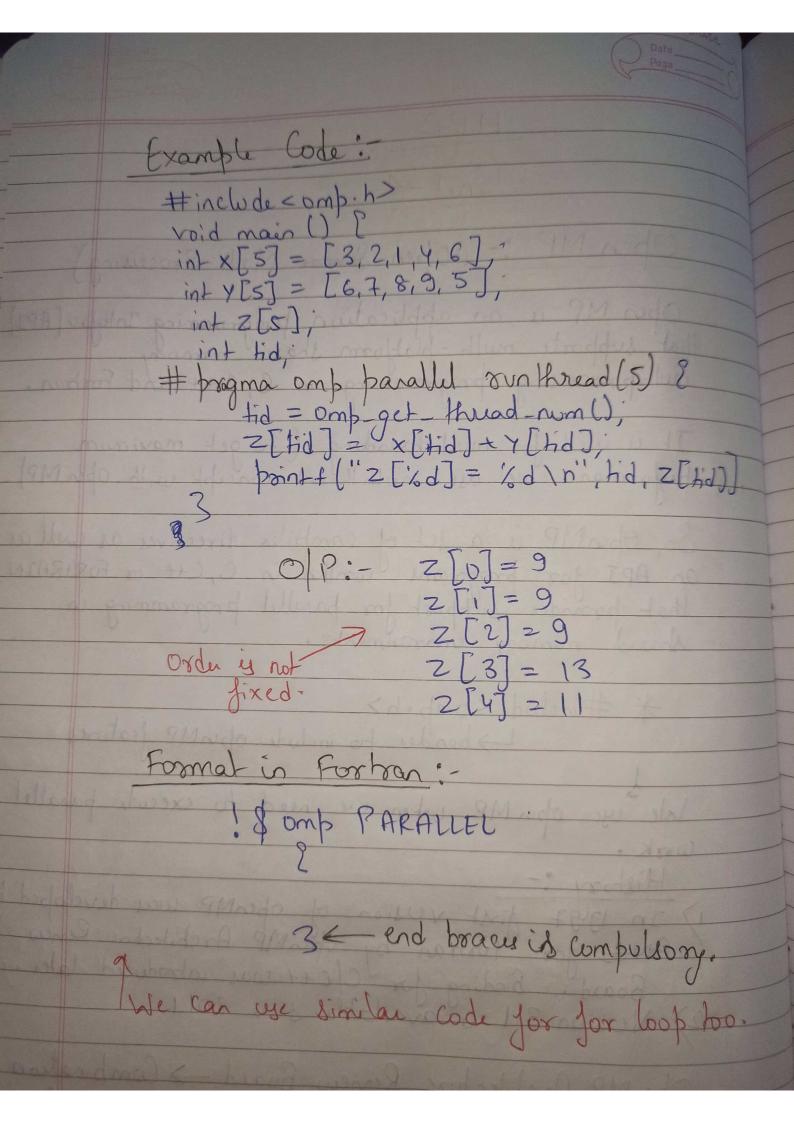
L> header to include openMP fratures

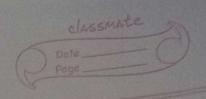
Work.

History:
1) In 19197 Jirst version of openMP was developed by Arthst Jor Fortran by openMP Architecture Reinew Board. Binding Jor C/C++ was introduced later.

2) Version 3.1 is available since 2011.

OpenMP Architecture Review Board -> Combination of various companies (Intel, HP, IBM, Grack, ARM, etc)





Steps to create Parallel program:

1) Include header file -2) Spicify parallel region 3) Set not of Kreads

Lo ble need to figure out most consuming part of code & place parallel statement before this.

Not - In OpenMP, there is no need to jetch again and again (no need to recreate). But in MPI we need to do it.

Adv. of open MP:-

De ving openMP.

Why we use?

1) Portable

2) Simple & Quick

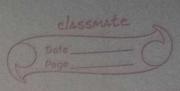
3) Support both fine grained & Coays grained

4) Compact API -> Simple & timiked set of

derivatives directive

5) Incremental parallelisation.

Name -> Akash kumas Reg. No-> RA2011003030001



Ausignment-3

Q.1. Explain about loop Scheduling and its types.

Ans Loop Scheduling is a technique used in parallel compuling to distribute the iterations of a loop among multiple threads or processors. The goal of loop scheduling is to balance the workload among threads, reduce contention, and improve the overall performance of parallel program.

Following are various types of loop scheduling:
Li) Static Scheduling: In this, the iterations of the

Loop are divided into a predicted fixed number of

Chenks and each Chunk is assigned to a

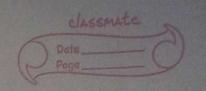
different thread or processor.

(ii) Dynamic Scheduling: - In this, the iterations of the look are divided dynamically, based on the current workload of each thread. Each thread is assigned a small no. of iterations at a time, and when it finishes those iterations, it request more from a global work given.

(iii) hvided Scheduling: - It is a type of dynamic where size of chunk is proportional to the no. of assigned iteration divided by no. of threads and the chunk size will be decreased too.

Churk size a Renaising iteration.
No. of threads.

- (iv) Runtime Scheduling: In this chunk size, ICV (Internal Control variable) will decide the chunk size.
- (v) Auto scheduling: In this compiler will devide church size automatically based on the characteristics of the loop and the hardware available.
- Q.2. Whit about impact of openMP work sharing constant.
- Ans > OpenMP is widely used programming model for parallel computing on shared memory architecture. Following are the impact of openMP on work sharing construct:
 - (i) Improved Performance: By distributing the work among multiple threads, the overall execution time can be reduced leading to improved performance.
 - (ii) Increased scalability: The work sharing combot can halp to improve the scalability of parallel programs by allowing them to use more threads or procusor as size of problem increases.
 - (iii) Load balancing: It can help to balance the workboad among threads, ensuing that each threads is executing a soughly enough equal amount of work.



(iv) Data Sharing: - OpenMP provides a set of derival directives for managing data sharing among threads. allowing them to access shared data in a saye and efficient manner.

(v) Code et complixity: The use of work sharing construct can sometimes increases the complexity of code.

Q.3. Writ a short not on Wave Joont parallelization.

Ans > hlavefront parallelization is a technique used in parallel computing to distribute tasks among & multiple processor or computing nodes. It is also known as data parallelism.

In this the compotation is divided into a set of independent tasks or data elemente that can be executed concurrently. These task are arranged in a wave-like pattern, where each sow or wave represents a set of tasks that can be executed in pareallel. Each wave is procused by a different procusor or complying node, and the results are then combined to obtain the final output.

Q.y. What is the difference between socialization and Jalse sharing?

Ans > Serialization and Jalse sharing are two performance issues that can occur in parallel computing, particularly when multiple threads or process access shared memory.

Page Page

Serialization refer to the situation where multiple threads or process are a shared resource or a critical section of a code one at a time. In other words, they must take turns arresing the resource and they cannot do so simultanously. Serialization can significantly reduce the performance of a parallel program as it can lead to contention and delays in accusing shared resources.

On the other hand Jake sharing occur when multiple threads or procuses being different variable or data structures that happen to be located on the same cache line or memory block. This can right in cache thrasing, when cache line is constantly invalidated and reloaded by different processors, even though they are not actually accusing the same data. It can cause significant performance degradation as it can lead to unnecessary cache exiction and buy traffic.