Experiment 2

Sinhgad Institutes | Date 11 | 1.

Title: Write a program to implement Parallel Bubble sort and Merge sort using OpenMP

Problem statement: Write a program to implement Parallel Bubble sort and Merge sort using OpenMP. Use existing algorithms and measure the performance of sequential and parallel algorithms.

Prerequisite: 64-bit open source Linux or its derivative

Programming Tools: Java / Perl / PHP / Python / Ruby / .net / MongoDB / MySQL / oracle

Objectives: To offload parallel computations to graphic card, when it is appropriate to do so, and to give some idea of how to think about code running.

Theory:

Introduction -

An application program Interface (API) that may be used to explicitly direct multithreaded, shared memory parallelism.

The programs are designed so that even if the compiler does not support them, the program will study correct behavior, but without any parallelism. Sorting is the process of putting data in order; either numerically or alphabetically. It is necessary to arrange the elements in an array in numerical

or lexicographical order, sorting numerical values in descending order or ascending order and alphabetical value like addresses key.

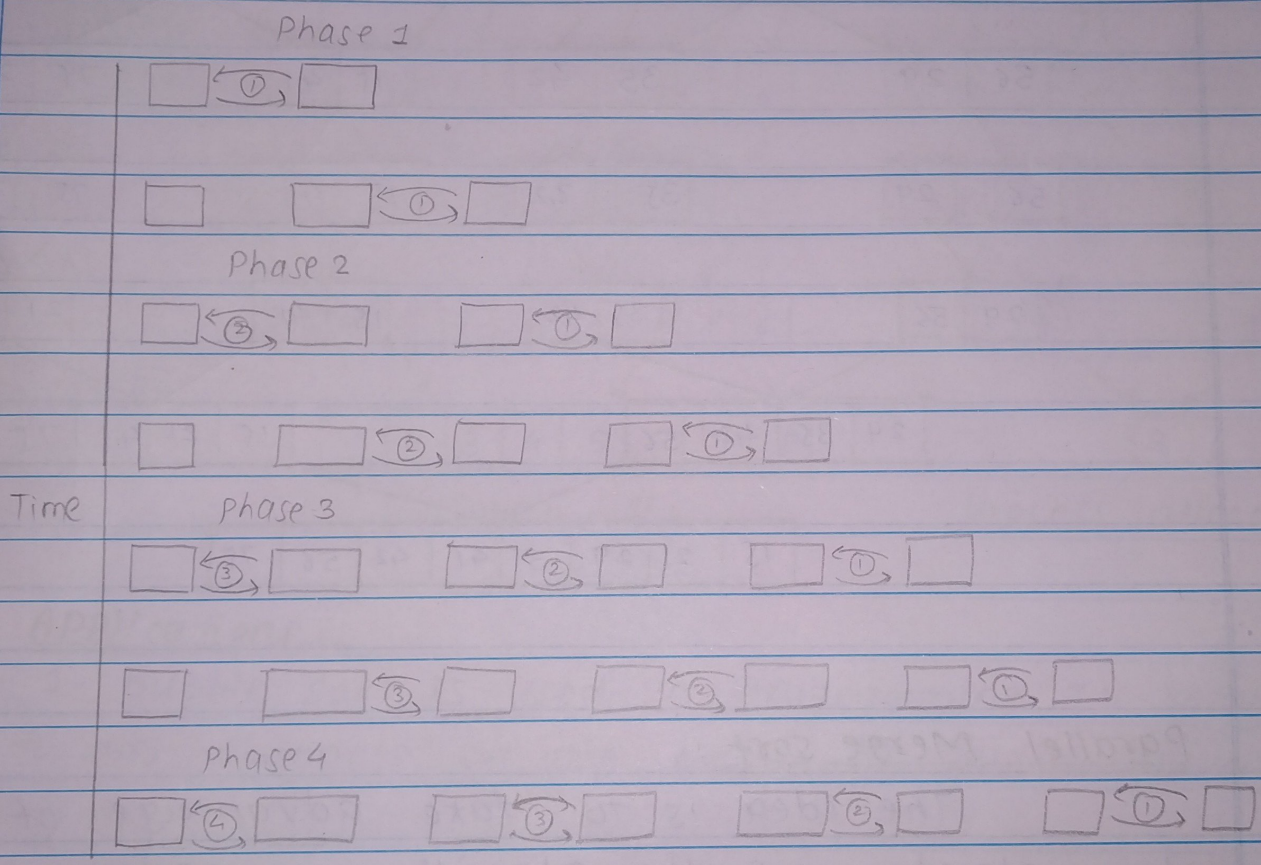
Sorting is used in many important applications and there have been a plenty of performance analysis. There are several sorting algorithms available to sort the elements of an array. some of the sorting algorithms are.

A. Bubble Sort :

In bubble sort, the largest number is first moved to the very end of the list by a series of compare-and-exchange operations, starting at the opposite end. The procedure repeats, stopping just before the previously positioned largest number.

Parallel Bubble Sort :

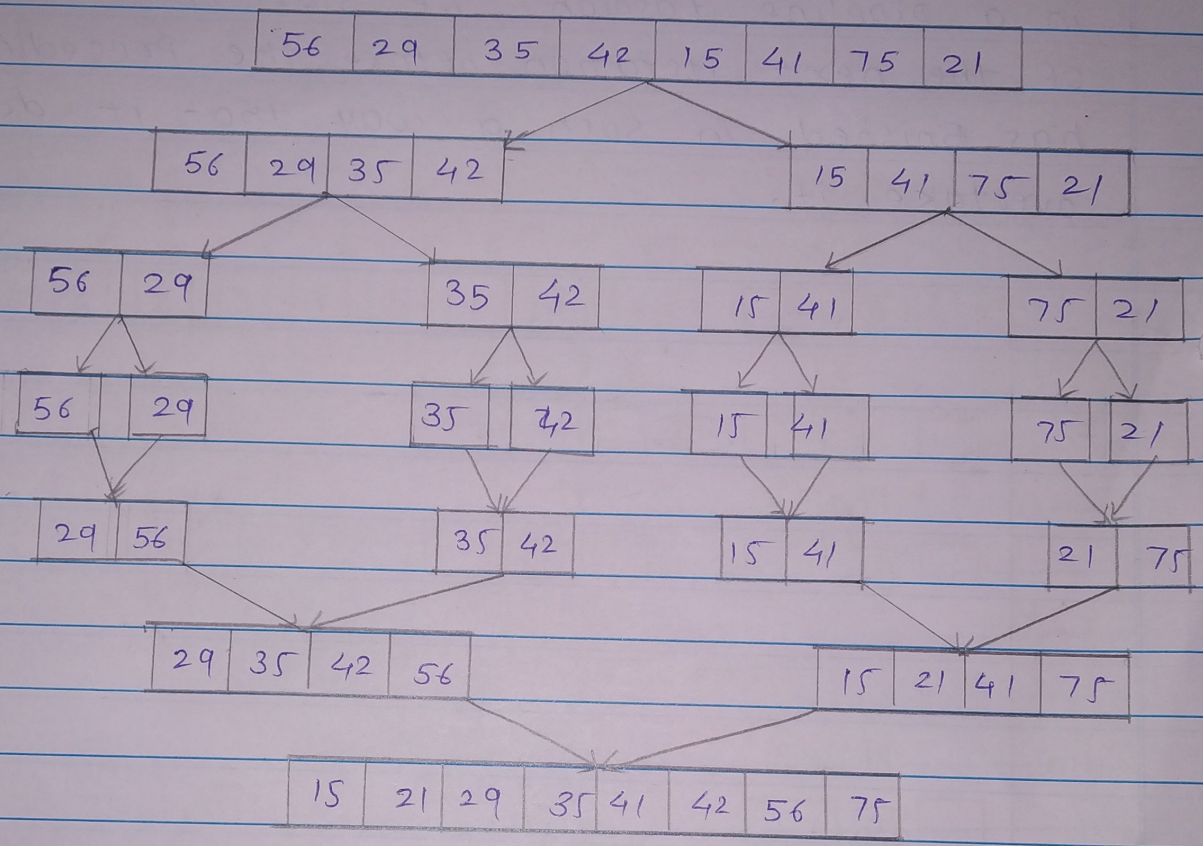
A possible idea is to run multiple iterations in a pipeline fashion, i.e start the bubbling action of the next iteration before the preceding iteration has finished in such a way that it does not overtake it.



B. Merge Sort :

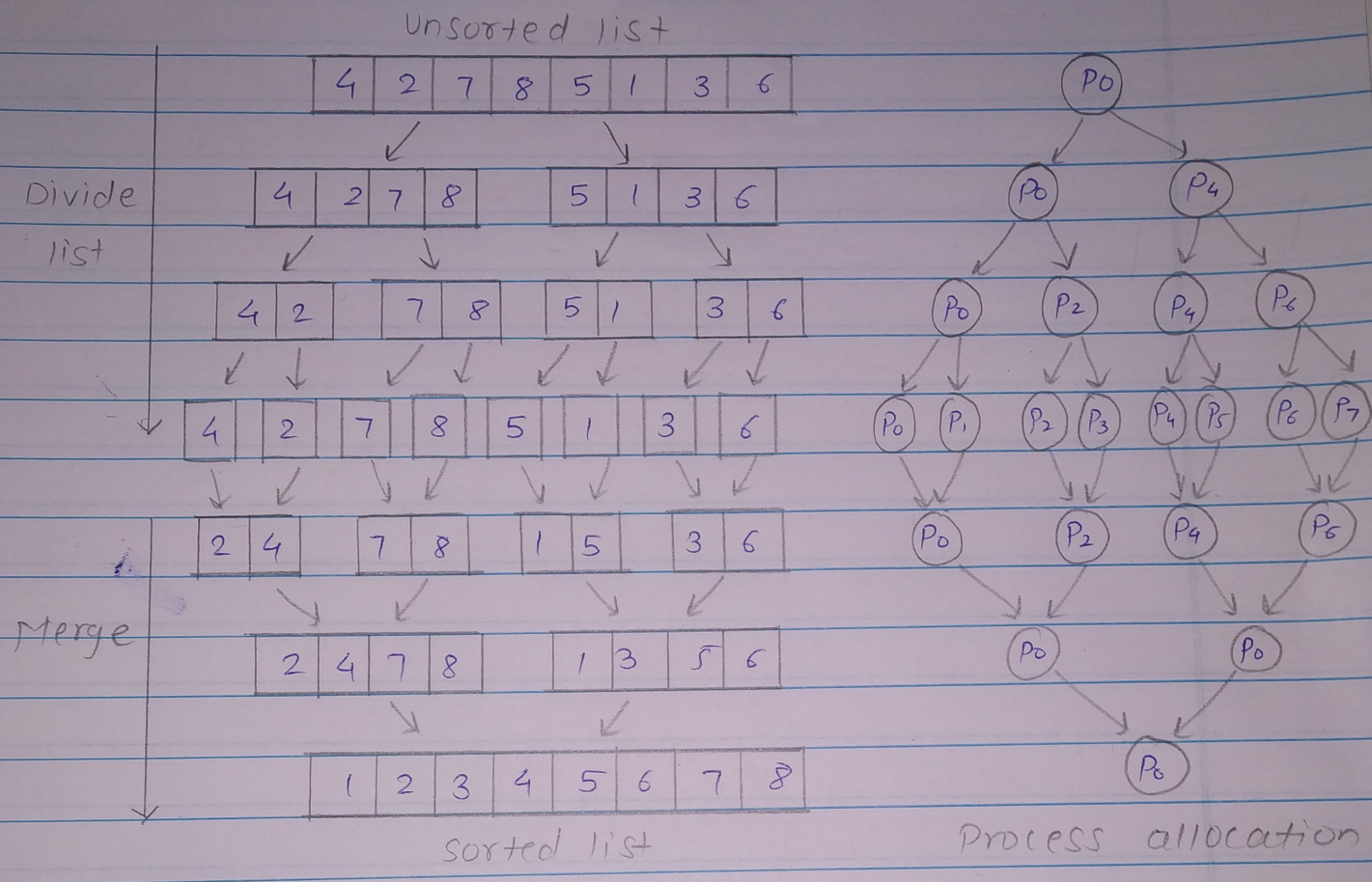
Merge sort is a classical sorting algorithm using a divide and conquer approach. The initial unsorted list is first divided in half, each half sub list is then applied the same division method until individual elements are obtained. Pairs of adjacent elements / sub lists are then merged into

sorted sub lists until the one fully merged and sorted list is obtained.



Parallel Merge sort :

The idea is to take advantage of the tree structure of the algorithm to assign work to processes. If communication time ignore, computations still only occur when merging the sub lists. But now, in the worst case, it takes 2s-1 steps to merge all sub lists of size s in a merging step.



Applications :

1. Bubble sort is used in programming TV remote to sort channels on the basis of longer viewing time.
2. Databases use an external merge sort to sort set of data that are too large to be loaded.

Conclusion :

We have tested both the sorting algorithms for different number elements with respective to time. As the no. of elements increased time required for openMP is reduced.