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Practical No.3

Aim: Implement Min, Max, Sum & Average operations using Parallel Reduction.

Objective: The objective of implementing Min, Max, Sum & Average operations using parallel Reduction is to efficiently compute these on large sets of data using multiple processors or nodes.

Theory:

Parallel Reduction:

Parallel Reduction is a technique used to perform aggregate functions on large set of data in parallel computing environment. The basic idea is to divide the data into smaller chunks & perform the reduction operation on each chunk independently before combining the intermediate results to obtain the final result. This technique can significantly reduce the computation time for large datasets.

Min, Max, Sum & Average operations:

Min, max, sum & average operations are commonly used aggregate functions in parallel reduction. The "min" operation returns the smallest value in the dataset. "max" returns the largest value, "sum" returns the total sum of all values, & "average" returns the mean value.

These operations can be used in various fields, including statistics, data analysis & machine learning.

Syntax used in Parallel Execution includes:

① Loops: Loops are used to divide the data into smaller chunks & distribute them among the availa-ble processors.

② Conditional Statement: Conditional statements are used to apply binary reduction operations to the intermediate results.

③ Functions: Functions are used to send & receive intermediate results between processors. For example, in MPI (Message passing Interface), you might use the "MPI_Send" & "MPI_Recv" functions to send & receive data between processors.

④ Parallel Computing Specific Syntax:
Depending on the parallel computing framework being used, there may be additional syntax specific to that framework.

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Conclusion: In Conclusion, implementing Min, Max, Sum & Average operations using parallel Reduction can significantly improve the performance of computation by efficiently distributing the workload among multiple processors.