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Subject: High Performance Computing



**Experiment No:03**

Title:Implement Min, Max ,Sum and Average operations using Parallel Reduction.

#include <iostream>

#include <cstdlib>

#include <ctime>

#include <omp.h>

using namespace std;

// Function to generate random array

void generateRandomArray(int arr[], int n) {

    srand(time(NULL));

    for (int i = 0; i < n; i++) {

        arr[i] = rand() % 100;

    }

}

// Function to find the minimum value in an array using parallel reduction

int findMin(int arr[], int n) {

    int min\_val = arr[0];

    #pragma omp parallel for reduction(min:min\_val)

    for (int i = 1; i < n; i++) {

        if (arr[i] < min\_val) {

            min\_val = arr[i];

        }

    }

    return min\_val;

}

// Function to find the maximum value in an array using parallel reduction

int findMax(int arr[], int n) {

    int max\_val = arr[0];

    #pragma omp parallel for reduction(max:max\_val)

    for (int i = 1; i < n; i++) {

        if (arr[i] > max\_val) {

            max\_val = arr[i];

        }

    }

    return max\_val;

}

// Function to find the sum of values in an array using parallel reduction

int findSum(int arr[], int n) {

    int sum = 0;

    #pragma omp parallel for reduction(+:sum)

    for (int i = 0; i < n; i++) {

        sum += arr[i];

    }

    return sum;

}

// Function to find the average value in an array using parallel reduction

double findAverage(int arr[], int n) {

    double avg = 0;

    #pragma omp parallel for reduction(+:avg)

    for (int i = 0; i < n; i++) {

        avg += arr[i];

    }

    avg /= n;

    return avg;

}

int main() {

    const int n = 10000;

    int arr[n];

    // Generate random array

    generateRandomArray(arr, n);

    // Find minimum value

    int min\_val = findMin(arr, n);

    cout << "Minimum value: " << min\_val << endl;

    // Find maximum value

    int max\_val = findMax(arr, n);

    cout << "Maximum value: " << max\_val << endl;

    // Find sum of values

    int sum = findSum(arr, n);

    cout << "Sum of values: " << sum << endl;

    // Find average value

    double avg = findAverage(arr, n);

    cout << "Average value: " << avg << endl;

    return 0;

}

OUTPUT🡪

