

Assignment No. 3

Min, Max, Sum and Average operations using Parallel Reduction

Code -

```
#include <iostream>
#include <vector>
#include <omp.h>
#include <climits>

using namespace std;

void min_reduction(vector<int>& arr) {
    int min_value = INT_MAX;
    #pragma omp parallel for reduction(min: min_value)
    for (int i = 0; i < arr.size(); i++) {
        if (arr[i] < min_value) {
            min_value = arr[i];
        }
    }
    cout << "Minimum value: " << min_value << endl;
}

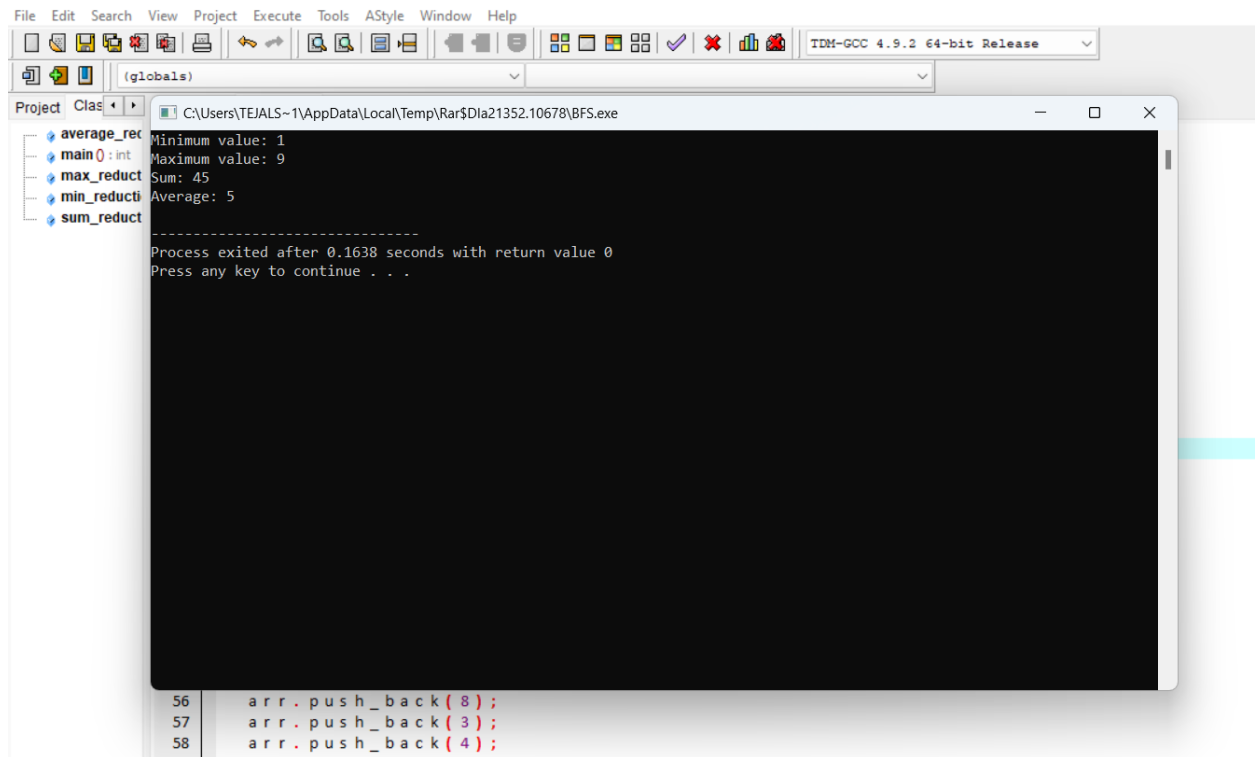
void max_reduction(vector<int>& arr) {
    int max_value = INT_MIN;
    #pragma omp parallel for reduction(max: max_value)
    for (int i = 0; i < arr.size(); i++) {
        if (arr[i] > max_value) {
            max_value = arr[i];
        }
    }
    cout << "Maximum value: " << max_value << endl;
}

void sum_reduction(vector<int>& arr) {
    int sum = 0;
    #pragma omp parallel for reduction(+: sum)
    for (int i = 0; i < arr.size(); i++) {
        sum += arr[i];
    }
    cout << "Sum: " << sum << endl;
}
```

```
void average_reduction(vector<int>& arr) {  
    int sum = 0;  
    #pragma omp parallel for reduction(+: sum)  
    for (int i = 0; i < arr.size(); i++) {  
        sum += arr[i];  
    }  
    cout << "Average: " << (double)sum / arr.size() << endl;  
}
```

```
int main() {  
    vector<int> arr;  
    arr.push_back(5);  
    arr.push_back(2);  
    arr.push_back(9);  
    arr.push_back(1);  
    arr.push_back(7);  
    arr.push_back(6);  
    arr.push_back(8);  
    arr.push_back(3);  
    arr.push_back(4);  
  
    min_reduction(arr);  
    max_reduction(arr);  
    sum_reduction(arr);  
    average_reduction(arr);  
}
```

Output -



The screenshot shows a C++ IDE with a project named "globals". The output window displays the results of a program execution. The program calculates the minimum, maximum, sum, and average of an array. The output shows: Minimum value: 1, Maximum value: 9, Sum: 45, and Average: 5. The process exited after 0.1638 seconds with return value 0. The source code in the background shows an array being pushed with values 8, 3, and 4.

```
File Edit Search View Project Execute Tools AStyle Window Help
(globals)
Project Class
average_rec Minimum value: 1
main() : int Maximum value: 9
max_reduct Sum: 45
min_reduct Average: 5
sum_reduct
-----
Process exited after 0.1638 seconds with return value 0
Press any key to continue . . .

56 arr.push_back(8);
57 arr.push_back(3);
58 arr.push_back(4);
```