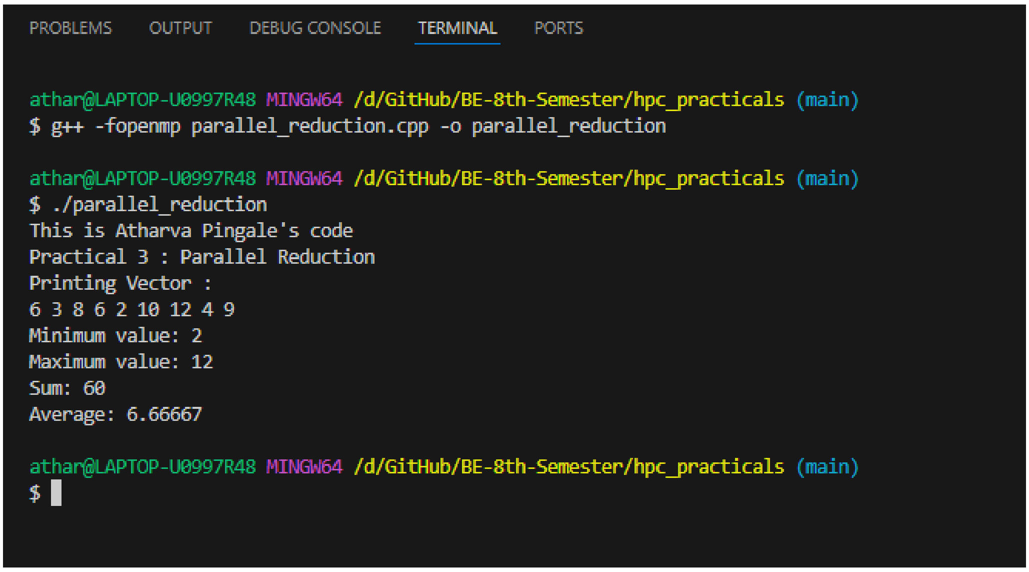
Practical 3 : Parallel Reduction

```
#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;
}

void print_arr(vector<int>&arr){
    for(int i=0;i<arr.size();i++){
        std::cout<<arr[i]<<" ";
    }
}

int main() {
  std::cout<<"This is Atharva Pingale's code";
  std::cout<<"\nPractical 3 : Parallel Reduction\n";
  vector<int> arr;
  arr.push_back(6);
  arr.push_back(3);
  arr.push_back(8);
  arr.push_back(6);
  arr.push_back(2);
  arr.push_back(10);
  arr.push_back(12);
  arr.push_back(4);
  arr.push_back(9);
  std::cout<<"Printing Vector : ";
  std::cout<<"\n";
  print_arr(arr);
  std::cout<<"\n";

#pragma omp parallel
{
    #pragma omp single
    {
        min_reduction(arr);
        max_reduction(arr);
        sum_reduction(arr);
        average_reduction(arr);
    }
}
}
```

Output :



```
athar@LAPTOP-U0997R48 MINGW64 /d/GitHub/BE-8th-Semester/hpc_practicals (main)
$ g++ -fopenmp parallel_reduction.cpp -o parallel_reduction

athar@LAPTOP-U0997R48 MINGW64 /d/GitHub/BE-8th-Semester/hpc_practicals (main)
$ ./parallel_reduction
This is Atharva Pingale's code
Practical 3 : Parallel Reduction
Printing Vector :
6 3 8 6 2 10 12 4 9
Minimum value: 2
Maximum value: 12
Sum: 60
Average: 6.66667

athar@LAPTOP-U0997R48 MINGW64 /d/GitHub/BE-8th-Semester/hpc_practicals (main)
$
```