Программа:

*//--------------------Подключаемые библиотеки--------------------//*

#include <headers/mpi.h>

#include <iostream>

#include <cstring>

#include <chrono>

#include <time.h>

*using* *namespace* std;

int **main**(int argc, char\* argv[])

{

*//--------------------Иициализация--------------------//*

int sizeX = 100;

int procNum, procRank, recv;

int m=5;*//кол-во* *итераций*

MPI\_Init(&argc, *&argv*);

MPI\_Comm\_size(MPI\_COMM\_WORLD, *&procNum*);

MPI\_Comm\_rank(MPI\_COMM\_WORLD, *&procRank*);

*//семя* *для* *функции* *rand(),* *смещено,* *чтобы* *было* *разное* *у* *разных* *процессов*

srand(time(0)+procRank + 314159 \* 451 % 42);

*auto* start = std::chrono::steady\_clock::now();

*//--------------------Запуск* *цикла--------------------//*

*if* (procRank == 0) {

cout << "Num of processors: " << procNum << endl;

}

*//--------------------Главный* *цикл--------------------//*

*for*(int j = 0; j < m; ++j){

*for*(int i = 0; i < procNum; ++i) {

int globalSum = 0;

int localSum = 0;

localSum = rand()%100;

*//cout* *<<* *"Local* *sum* *of* *process* *"* *<<* *procRank* *<<* *"* *is* *"* *<<* *localSum* *<<* *endl;*

MPI\_Reduce(&localSum, *&globalSum*, 1, MPI\_INT, MPI\_SUM, i, MPI\_COMM\_WORLD);

*if*(globalSum != 0){

cout << "Process " << procRank << " recieved " << globalSum << endl;

}

}

}

*//--------------------Завершение* *работы* *MPI--------------------//*

MPI\_Finalize();

*auto* end = std::chrono::steady\_clock::now();

std::chrono::duration<double> elapsed\_seconds = end-start;

std::cout << "elapsed time: " << elapsed\_seconds.count() << "s\n";

*return* 0;

}

Вывод программы (4 процесса):

Num of processors: 4

Process 0 recieved 172

Process 1 recieved 236

Process 2 recieved 158

Process 3 recieved 179

Process 0 recieved 228

Process 1 recieved 253

Process 2 recieved 160

Process 3 recieved 185

Process 0 recieved 138

Process 1 recieved 311

Process 2 recieved 220

Process 3 recieved 116

Process 0 recieved 162

Process 1 recieved 231

Process 2 recieved 90

Process 3 recieved 156

Process 0 recieved 248

Process 1 recieved 225

Process 2 recieved 226

Process 3 recieved 219

elapsed time: 0.0042133s

elapsed time: 0.0041996s

elapsed time: 0.0042481s

elapsed time: 0.0042865s