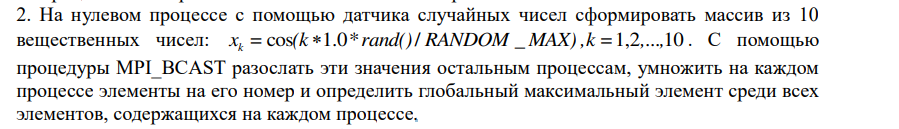
Отчет №2

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Описание работы:

Сначала мы создаем массив из 10 вещественных чисел на процессе 0, после чего с помощью MPI\_BCAST передаем созданный массив на все процессы. Каждый процесс в свою очередь умножает элементы массива на свой номер. И в конце находим глобальный максимум среди всех элементов на каждом процессе.

Код для вставки :

#include <stdio.h>

#include <stdlib.h>

#include <math.h>

#include <mpi.h>

#include <time.h>

#define ARRAY\_SIZE 10

int main(int argc, char\*\* argv) {

int rank, size;

double local\_array[ARRAY\_SIZE];

double global\_max;

MPI\_Init(&argc, &argv);

MPI\_Comm\_rank(MPI\_COMM\_WORLD, &rank);

MPI\_Comm\_size(MPI\_COMM\_WORLD, &size);

srand(time(0) + rank);

if (rank == 0) {

//printf("Massiv\n");

for (int i = 0; i < ARRAY\_SIZE; i++) {

local\_array[i] = cos(1.0 \*(i+1) \* rand() /(double) RAND\_MAX);

printf("local[%d ] = %f\n\n",i ,local\_array[i]);

}

}

MPI\_Bcast(local\_array, ARRAY\_SIZE, MPI\_DOUBLE, 0, MPI\_COMM\_WORLD);

// printf("rank %d\n",rank);

for (int i = 0; i < ARRAY\_SIZE && rank != 0; i++) {

local\_array[i] \*= (rank);

printf("local[%d ]\* %d = %f\n", i ,rank,local\_array[i]);

}

double local\_max = local\_array[0];

for (int i = 1; i < ARRAY\_SIZE && rank !=0; i++) {

if (local\_array[i] > local\_max) {

local\_max = local\_array[i];

printf(" rank %d , max %f\n\n", rank , local\_max);

}

}

MPI\_Reduce(&local\_max, &global\_max, 1, MPI\_DOUBLE, MPI\_MAX, 0, MPI\_COMM\_WORLD);

if (rank == 0) {

printf("Global maximum: %f\n", global\_max);

}

MPI\_Finalize();

return 0;

}

**Результаты**

**1-процесс**

local[0 ] = 0.993914

local[1 ] = 0.902443

local[2 ] = -0.489867

local[3 ] = 0.938090

local[4 ] = -0.958757

local[5 ] = 0.991967

local[6 ] = -0.409837

local[7 ] = -0.750573

local[8 ] = -0.831263

local[9 ] = -0.343213

Global maximum: 0.993914

**2-процесса**

local[0 ] = 0.923928

local[1 ] = 0.974470

local[2 ] = 0.269358

local[3 ] = 0.560658

local[4 ] = -0.985590

local[5 ] = -0.414585

local[6 ] = 0.402016

local[7 ] = -0.574022

local[8 ] = -0.404803

local[9 ] = 0.856099

Global maximum: 0.974470

local[0 ]\* 1 = 0.923928

local[1 ]\* 1 = 0.974470

local[2 ]\* 1 = 0.269358

local[3 ]\* 1 = 0.560658

local[4 ]\* 1 = -0.985590

local[5 ]\* 1 = -0.414585

local[6 ]\* 1 = 0.402016

local[7 ]\* 1 = -0.574022

local[8 ]\* 1 = -0.404803

local[9 ]\* 1 = 0.856099

rank 1 , max 0.974470

**4-процесса**

local[0 ] = 0.652013

local[1 ] = -0.116548

local[2 ] = -0.191927

local[3 ] = -0.988968

local[4 ] = 0.068986

local[5 ] = -0.990461

local[6 ] = 0.924737

local[7 ] = 0.014851

local[8 ] = -0.902904

local[9 ] = -0.458097

Global maximum: 2.774210

local[0 ]\* 1 = 0.652013

local[1 ]\* 1 = -0.116548

local[2 ]\* 1 = -0.191927

local[3 ]\* 1 = -0.988968

local[4 ]\* 1 = 0.068986

local[5 ]\* 1 = -0.990461

local[6 ]\* 1 = 0.924737

local[7 ]\* 1 = 0.014851

local[8 ]\* 1 = -0.902904

local[9 ]\* 1 = -0.458097

rank 1 , max 0.924737

local[0 ]\* 2 = 1.304026

local[1 ]\* 2 = -0.233096

local[2 ]\* 2 = -0.383853

local[3 ]\* 2 = -1.977936

local[4 ]\* 2 = 0.137971

local[5 ]\* 2 = -1.980922

local[6 ]\* 2 = 1.849473

local[7 ]\* 2 = 0.029703

local[8 ]\* 2 = -1.805809

local[9 ]\* 2 = -0.916193

rank 2 , max 1.849473

local[0 ]\* 3 = 1.956040

local[1 ]\* 3 = -0.349644

local[2 ]\* 3 = -0.575780

local[3 ]\* 3 = -2.966904

local[4 ]\* 3 = 0.206957

local[5 ]\* 3 = -2.971382

local[6 ]\* 3 = 2.774210

local[7 ]\* 3 = 0.044554

local[8 ]\* 3 = -2.708713

local[9 ]\* 3 = -1.374290

rank 3 , max 2.774210

**6 -процессов**

local[0 ] = 0.984949

local[1 ] = 0.999977

local[2 ] = -0.422127

local[3 ] = -0.900323

local[4 ] = 0.298117

local[5 ] = -0.756704

local[6 ] = -0.769645

local[7 ] = -0.207145

local[8 ] = 0.121047

local[9 ] = -0.387218

local[0 ]\* 2 = 1.969899

local[1 ]\* 2 = 1.999953

local[2 ]\* 2 = -0.844253

local[3 ]\* 2 = -1.800646

local[4 ]\* 2 = 0.596234

local[5 ]\* 2 = -1.513408

local[6 ]\* 2 = -1.539290

local[7 ]\* 2 = -0.414290

local[8 ]\* 2 = 0.242094

local[9 ]\* 2 = -0.774435

rank 2 , max 1.999953

local[0 ]\* 3 = 2.954848

local[1 ]\* 3 = 2.999930

local[2 ]\* 3 = -1.266380

local[3 ]\* 3 = -2.700968

local[4 ]\* 3 = 0.894351

local[5 ]\* 3 = -2.270112

local[6 ]\* 3 = -2.308935

local[7 ]\* 3 = -0.621434

local[8 ]\* 3 = 0.363140

local[9 ]\* 3 = -1.161653

rank 3 , max 2.999930

local[0 ]\* 1 = 0.984949

local[1 ]\* 1 = 0.999977

local[2 ]\* 1 = -0.422127

local[3 ]\* 1 = -0.900323

local[4 ]\* 1 = 0.298117

local[5 ]\* 1 = -0.756704

local[6 ]\* 1 = -0.769645

local[7 ]\* 1 = -0.207145

local[8 ]\* 1 = 0.121047

local[9 ]\* 1 = -0.387218

rank 1 , max 0.999977

Global maximum: 4.999883

local[0 ]\* 4 = 3.939798

local[1 ]\* 4 = 3.999906

local[2 ]\* 4 = -1.688507

local[3 ]\* 4 = -3.601291

local[4 ]\* 4 = 1.192468

local[5 ]\* 4 = -3.026815

local[6 ]\* 4 = -3.078579

local[7 ]\* 4 = -0.828579

local[8 ]\* 4 = 0.484187

local[9 ]\* 4 = -1.548870

rank 4 , max 3.999906

local[0 ]\* 5 = 4.924747

local[1 ]\* 5 = 4.999883

local[2 ]\* 5 = -2.110633

local[3 ]\* 5 = -4.501614

local[4 ]\* 5 = 1.490586

local[5 ]\* 5 = -3.783519

local[6 ]\* 5 = -3.848224

local[7 ]\* 5 = -1.035724

local[8 ]\* 5 = 0.605234

local[9 ]\* 5 = -1.936088

rank 5 , max 4.999883

**8-процессов**

local[0 ] = 0.717984

local[1 ] = 0.993802

local[2 ] = -0.984841

local[3 ] = -0.812313

local[4 ] = -0.649725

local[5 ] = -0.903904

local[6 ] = -0.275811

local[7 ] = 0.653587

local[8 ] = 0.929594

local[9 ] = 0.845049

local[0 ]\* 1 = 0.717984

local[1 ]\* 1 = 0.993802

local[2 ]\* 1 = -0.984841

local[3 ]\* 1 = -0.812313

local[4 ]\* 1 = -0.649725

local[5 ]\* 1 = -0.903904

local[6 ]\* 1 = -0.275811

local[7 ]\* 1 = 0.653587

local[8 ]\* 1 = 0.929594

local[9 ]\* 1 = 0.845049

rank 1 , max 0.993802

local[0 ]\* 2 = 1.435968

local[1 ]\* 2 = 1.987604

local[2 ]\* 2 = -1.969683

local[3 ]\* 2 = -1.624627

local[4 ]\* 2 = -1.299450

local[5 ]\* 2 = -1.807807

local[6 ]\* 2 = -0.551621

local[7 ]\* 2 = 1.307174

local[8 ]\* 2 = 1.859188

local[9 ]\* 2 = 1.690098

rank 2 , max 1.987604

local[0 ]\* 3 = 2.153952

local[1 ]\* 3 = 2.981407

local[2 ]\* 3 = -2.954524

local[3 ]\* 3 = -2.436940

local[4 ]\* 3 = -1.949175

local[5 ]\* 3 = -2.711711

local[6 ]\* 3 = -0.827432

local[7 ]\* 3 = 1.960760

local[8 ]\* 3 = 2.788781

local[9 ]\* 3 = 2.535147

rank 3 , max 2.981407

local[0 ]\* 4 = 2.871935

local[1 ]\* 4 = 3.975209

local[2 ]\* 4 = -3.939365

local[3 ]\* 4 = -3.249254

local[4 ]\* 4 = -2.598900

local[5 ]\* 4 = -3.615614

local[6 ]\* 4 = -1.103243

local[7 ]\* 4 = 2.614347

local[8 ]\* 4 = 3.718375

local[9 ]\* 4 = 3.380196

rank 4 , max 3.975209

local[0 ]\* 5 = 3.589919

local[1 ]\* 5 = 4.969011

local[2 ]\* 5 = -4.924207

local[3 ]\* 5 = -4.061567

local[4 ]\* 5 = -3.248624

local[5 ]\* 5 = -4.519518

local[6 ]\* 5 = -1.379053

local[7 ]\* 5 = 3.267934

local[8 ]\* 5 = 4.647969

local[9 ]\* 5 = 4.225244

rank 5 , max 4.969011

local[0 ]\* 6 = 4.307903

local[1 ]\* 6 = 5.962813

local[2 ]\* 6 = -5.909048

local[3 ]\* 6 = -4.873881

local[4 ]\* 6 = -3.898349

local[5 ]\* 6 = -5.423421

local[6 ]\* 6 = -1.654864

local[7 ]\* 6 = 3.921521

local[8 ]\* 6 = 5.577563

local[9 ]\* 6 = 5.070293

rank 6 , max 5.962813

local[0 ]\* 7 = 5.025887

local[1 ]\* 7 = 6.956616

local[2 ]\* 7 = -6.893889

local[3 ]\* 7 = -5.686194

local[4 ]\* 7 = -4.548074

local[5 ]\* 7 = -6.327325

local[6 ]\* 7 = -1.930675

local[7 ]\* 7 = 4.575108

local[8 ]\* 7 = 6.507157

local[9 ]\* 7 = 5.915342

rank 7 , max 6.956616

Global maximum: 6.956616

Вывод :

В ходе решения практического задания, я MPI\_BCAST, с помощью этого у меня получилось транслировать содержимое процесса 0 всем остальным процессам.(это процедура коллективной связи в MPI, схема 1 ко ВСЕМ). MPI\_BCAST синхронизирует все процессы.