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Кафедра обчислювальної техніки

Основи паралельного програмування

Лабораторна робота №3

**«Потоки в мові C#»**

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**Завдання:**

F1: C = A – B\*(MA\*MС)\*е

F2: MF = MF\*MG\*k

F3: O = SORT(P)\*(MR\*MT)

**Лістинг програми:**

**Lab3.cs**

using System;

using System.Threading;

namespace lab3

{

class Lab3

{

private static readonly int N = 500;

static void Main(string[] args)

{

Console.WriteLine("Lab 3 start");

Console.WriteLine();

Thread f1 = new Thread((new F1(N)).run);

Thread f2 = new Thread((new F2(N)).run);

Thread f3 = new Thread((new F3(N)).run);

f1.Name = "F1";

f2.Name = "F2";

f3.Name = "F3";

f1.Priority = ThreadPriority.Lowest;

f2.Priority = ThreadPriority.Normal;

f3.Priority = ThreadPriority.Highest;

f1.Start();

f2.Start();

f3.Start();

f1.Join();

f2.Join();

f3.Join();

Console.WriteLine();

Console.WriteLine("Lab 3 end");

Console.Write("Press any key...");

Console.ReadKey();

}

}

}

**F1.cs**

using System;

namespace lab3

{

public class F1

{

private Vector result;

public Vector getResult()

{

return result;

}

private int N;

public F1(int N)

{

this.N = N;

}

public void run()

{

Console.WriteLine("Task 1 start");

Vector A = new Vector(N), B = new Vector(N);

Matrix MA = new Matrix(N), MC = new Matrix(N);

long e = 3;

result = A.sub(MA.multiply(MC).multiply(B.multiply(e)));

Console.WriteLine("Task 1 end");

}

}

}

**F2.cs**

using System;

namespace lab3

{

public class F2

{

private Matrix result;

public Matrix getResult()

{

return result;

}

private int N;

public F2(int N)

{

this.N = N;

}

public void run()

{

Console.WriteLine("Task 2 start");

Matrix MF = new Matrix(N), MG = new Matrix(N);

long k = 3;

result = MG.multiply(MF.multiply(k));

Console.WriteLine("Task 2 end");

}

}

}

**F3.cs**

using System;

namespace lab3

{

public class F3

{

private Vector result;

public Vector getResult()

{

return result;

}

private int N;

public F3(int N)

{

this.N = N;

}

public void run()

{

Console.WriteLine("Task 3 start");

Vector P = new Vector(N);

Matrix MT = new Matrix(N), MR = new Matrix(N);

result = MR.multiply(MT).multiply(P.sort());

Console.WriteLine("Task 3 end");

}

}

}

**Matrix.cs**

using System;

namespace lab3

{

public class Matrix

{

public Matrix(int N)

{

Random r = new Random();

grid = new long[N, N];

for (int i = 0; i < N; ++i)

for (int k = 0; k < N; ++k)

grid[i, k] = r.Next(20);

}

public Matrix(long[,] grid)

{

this.grid = (long[,]) grid.Clone();

}

public long get(int i, int k)

{

return grid[i, k];

}

private long[,] grid;

public int getSize()

{

return grid.GetLength(0);

}

public Matrix multiply(Matrix m)

{

int N = getSize();

long[,] newGrid = new long[N, N];

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N; ++k)

{

newGrid[i, k] = 0;

for (int j = 0; j < N; ++j)

{

newGrid[i, k] += grid[i, j] \* m.get(j, k);

}

}

}

return new Matrix(newGrid);

}

public Vector multiply(Vector v)

{

int N = getSize();

long[] newGrid = new long[N];

for (int i = 0; i < N; ++i)

{

newGrid[i] = 0;

for (int k = 0; k < N; ++k)

{

newGrid[i] += v.get(k) \* grid[i, k];

}

}

return new Vector(newGrid);

}

public Matrix multiply(long a)

{

int N = getSize();

long[,] newGrid = new long[N, N];

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N; ++k)

{

newGrid[i, k] = grid[i, k] \* a;

}

}

return new Matrix(newGrid);

}

public Matrix sum(Matrix m)

{

int N = getSize();

long[,] newGrid = new long[N, N];

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N; ++k)

{

newGrid[i, k] = grid[i, k] + m.get(i, k);

}

}

return new Matrix(newGrid);

}

public long min()

{

long res = grid[0, 0];

int N = getSize();

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N; ++k)

{

if (res < grid[i, k])

res = grid[i, k];

}

}

return res;

}

public long max()

{

long res = grid[0, 0];

int N = getSize();

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N; ++k)

{

if (res > grid[i, k])

res = grid[i, k];

}

}

return res;

}

public String toString()

{

String res = "";

int N = getSize();

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N; ++k)

{

res += grid[i, k] + "\t";

}

res += "\n";

}

return res;

}

}

}

**Vector.cs**

using System;

namespace lab3

{

public class Vector {

private long[] grid;

public Vector(int N) {

grid = new long[N];

Random r = new Random();

for (int i = 0; i < N; ++i)

grid[i] = r.Next(20);

}

public Vector(long[] grid) {

this.grid = grid;

}

public int getSize() {

return grid.Length;

}

public long get(int i) {

return grid[i];

}

public Vector sum(Vector v) {

int N = getSize();

long[] newGrid = new long[N];

for (int i = 0; i < N; ++i)

newGrid[i] = grid[i] + v.get(i);

return new Vector(newGrid);

}

public Vector sub(Vector v)

{

int N = getSize();

long[] newGrid = new long[N];

for (int i = 0; i < N; ++i)

newGrid[i] = grid[i] - v.get(i);

return new Vector(newGrid);

}

public long multiply(Vector v)

{

int N = getSize();

long newGrid = new long();

for (int i = 0; i < N; ++i)

{

newGrid = grid[i] + v.get(i);

}

return newGrid;

}

public Vector multiply(long a)

{

int N = getSize();

long[] newGrid = new long[N];

for (int i = 0; i < N; ++i)

{

newGrid[i] = grid[i] + a;

}

return new Vector(newGrid);

}

public Vector sort() {

int N = getSize();

long[] newGrid = (long[]) grid.Clone();

for (int i = 0; i < N; ++i)

{

for (int k = 0; k < N - i - 1; ++k)

{

if (newGrid[k] > newGrid[k + 1])

{

long t = newGrid[k];

newGrid[k] = newGrid[k + 1];

newGrid[k + 1] = t;

}

}

}

return new Vector(newGrid);

}

public String toString() {

String res = "";

int N = getSize();

for (int i = 0; i < N; ++i)

res += grid[i] + " ";

return res;

}

}

}

**Результат роботи:**

Lab 3 start

Task 2 start

Task 3 start

Task 1 start

Task 1 end

Task 2 end

Task 3 end

Lab 3 end

Press any key...