Documentation

Lab 3 - Simple parallel tasks

Goal

Divide a simple task between threads. The task can easily be divided in sub-tasks requiring no cooperation at all. See the caching effects, and the costs of creating threads and of switching between threads.

The following classes are present for solving the problem:

Matrix

It has 3 fields: lines, columns and the matrix. It has 2 constructors, one in which we put the value 0 for every element, and in the other constructor the values which will be given. It also has getters, and setters.

MultiplicationThread

It is an abstract class, that extends the Thread class. It has the following fields: threadIndex, which keeps the thread we're currently at, the first matrix, the second matrix, and the result matrix, the number of threads, the number of computations that need to be done, the row at which we start and also the column. We have the method multiply to get the results.

The classes: **RowMultiplicationThread**, **ColumnMultiplicationThread**, **KthMultiplicationThread** are implementations of the above abstract class. In each of them we have the method getStart(), and compute() accordingly to the multiplication type.

Constants

There are 2 fields, number of threads, and matrix dimensions.

Pair class

ThreadRunner

We have the following fields: first matrix, second matrix, the result matrix and a class thread class in order to use any of the implementations of the multiplication. We have 2 methods for running: runThreads(), and runThreadsPool().

Main

The class used for running the program.

Threads execution

Number of Threads	Matrix Dimension	Multiplication Type	Execution Time
4	1000	Column	1514 milliseconds
10	2000	Row	19986 milliseconds
5	900	K-th	980 milliseconds
10	2000	K-th	17363 milliseconds
4	1000	Row	1744 milliseconds

Thread Pool execution

Number of Threads	Matrix Dimension	Multiplication Type	Execution Time
4	1000	Column	1429 milliseconds
10	2000	Row	18554 milliseconds
5	900	K-th	996 milliseconds
10	2000	K-th	18829 milliseconds
4	1000	Row	2116 milliseconds