Practical Session 3 : Stencil parallelism

Objective

The objective of this lab is to analyse some sequential problem and apply parallelism methods using the *OpenMP* library. You should write your code using the *C* language.

1 – Resolution of string equation

The goal of this exercise is to create the parallel program that is efficient. The resolution is based on the finite difference method using a stencil approach.

In the stencil approach, the computation of each new value is based on a constant pattern for every initial data in some array.

The provided sequential code use the stencil method to solve the string equation.

▶ Study the performances of the sequential program by modifying the input parameters m and n that define the size of the problem.

▶ Identify the dependencies (time and space) between the different parts of the program and between the data.

▶ Write a parallel version of the program using some approaches mentioned during the lectures. Several strategies are possible.

▶ Study the performances of your code by changing the number of processors and the size of the problem.

2 – Resolution of heat equation

The goal of this exercise is to create the parallel program that is efficient. The resolution is based on the finite difference method using a stencil approach.

In the stencil approach, the computation of each new value is based on a constant pattern for every initial data in some array.

The provided sequential code use the stencil method to solve the heat equation.

▶ Study the performances of the sequential program by modifying the input parameters m and n that define the size of the problem.

▶ Identify the dependencies (time and space) between the different parts of the program and between the data.

▶ Write a parallel version of the program using some approaches mentioned during the lectures. Several strategies are possible.

▶ Study the performances of your code by changing the number of processors and the size of the problem.