

Notebook 2: #pragma omp for

Making the same thing, in an easier way

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Introduction

We would like to get rid of all the overhead on the for loops ranges we had to handle.

OpenMP allows the concatenation of constructs.

The typical pragma:

```
#pragma omp parallel
```

Can be combined with:

```
#pragma omp for
```

To tell the compiler the following for-loop can be refactored by OpenMP, to execute the operations using the thread pool created by `parallel`.

```
#include "StopWatch.h"
#include <omp.h>
#include <iostream>

const long num_steps = 500000000; //number of x bins

int main()
{
    Stopwatch stopWatch;

    double x, pi, sum = 0.0;
    step = 1.0/(double) num_steps; //x-step
    int n_threads=1;

    #pragma omp parallel
    {
        n_threads = omp_get_num_threads();

        // OpenMP can handle the for us for loop ranges!
        // TIP: you have to add something in the following line...

        for (long i=1; i<=num_steps; i++) {
            x = (i - 0.5) * step; //computing the x value
            sum += 4.0 / (1.0 + x * x); //adding to the cumulus
        }

        pi = step * sum;

        printf("Pi value: %f\n
        Number of steps: %d\n
        Number of threads: %d\n",
        pi, num_steps, n_threads;
        return 0;
    }
}
```

Introduction

Be aware that, if no code has to be put between the two pragmas, the directive can be written as:

`#pragma omp parallel for`

Since in this example and in the previous exercise we use `omp_get_num_threads()`, that returns 1 outside of parallel sections, we want to keep the two pragmas splitted.

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int main()
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    Stopwatch stopWatch;

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    #pragma omp parallel
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        printf("Pi value: %f\n
        Number of steps: %d\n
        Number of threads: %d\n",
        pi,num_steps,n_threads;
        return 0;
    }
}
```

And now again... Make the code *rain*!

Try to complete the exercise using `#pragma omp for`



```
0 1 0 1 0
1 0 1 0 1
0 1 0 1 0
1 0 1 0 1
0 1 0 1 0
1 0 1 0 1
0 1 0 1 0
1 0 1 0 1
0 1 0 1 0
1 0 1 0 1
0 1 0 1 0
1 0 1 0 1
```