MI3.22 – Advanced Programming for HPC
Labwork 1 – *MAP, GATHER and SCATTER*

For each exercise, check its computation time (launch the calculation two or three times in a loop before to measure the time, since GPU takes some time to wake-up).

Some pieces of implementation are provided in skeletons ... use them!

Exercise 1: Just try the previous examples (slides 4, 5 and 7), by doing it yourself ...

1. For two vectors containing data on the host (with at least 2^{16} values).
2. For two vectors of the same size, but using counting and constant iterators.
3. For three vectors (on CPU) of the same size.

Exercise 2: Separate the odd and the even number ...

1. Write a function that takes as input a large vector of integers, and that separates and returns the same vector containing first the data at even indexes and then the ones at odd indexes. This first function uses GATHER.
   e.g.: $\{1, 2, 3, 4, 5, 6\}$ becomes $\{1, 3, 5, 2, 4, 6\}$.
2. Do the same using SCATTER.
3. Do the same but for more heavy objects (the structure `MyDataType` by adding some useless data). You may use SCATTER or GATHER, as you prefer.