COMPUTAÇÃO DE ALTO DESEMPENHO

2018/2019

CUDA Lab 1

1. Implement a pair-wise addition of two arrays, placing the result in a third array.

   A skeleton of the solution is provided in cadlabs/lab1
   See slides P01-CUDA-Basics

2. Build on the previous exercise to implement the following algorithm:

```
given arrays A and B of size N, and filled with random numbers, compute array D of
the same size, such that:

C = A + B
C = C - 1
for i in [0, N/2[
    D[i] = C[N-1-i]
```

   Use as few CUDA kernels as possible.

   Goal: first contact with the limitations of inter-thread coordination in CUDA. Understand that many behaviors have to be broken in multiple kernels.

   See slides P01-CUDA-2D

3. Convert an RGB image into a gray scale image. The input is an RGB triple of float values that you must convert into a single float grayscale intensity value. A pseudo-code version of the algorithm is shown below:

```
for ii from 0 to height do
    for jj from 0 to width do
        idx = ii * width + jj
        # here channels is 3
        r = input[3*idx]
        g = input[3*idx + 1]
        b = input[3*idx + 2]
        grayImage[idx] = (0.21*r + 0.71*g + 0.07*b)
    end
end
```

   Goal: first contact with multi-dimensional CUDA grids.

   A skeleton of the solution is provided in cadlabs/lab1