CUDA – GPU Programming
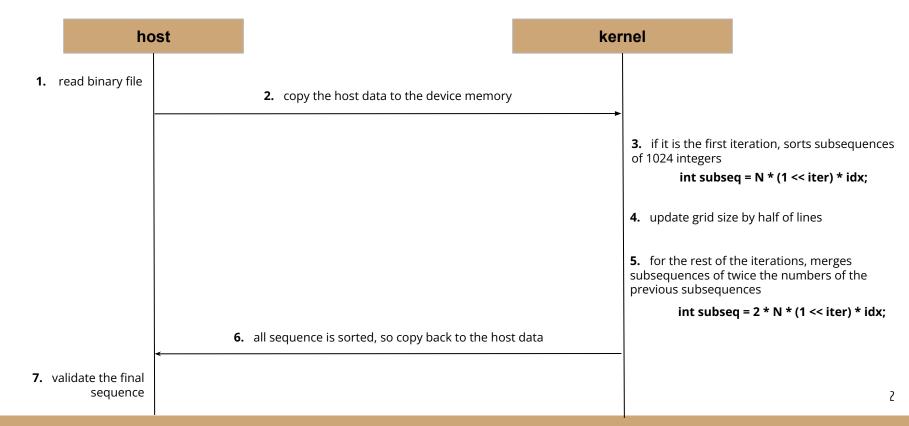
Computação em Larga Escala
Assignment 3

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Sort Integers by Rows - Implementation

host

kernel

1. read binary file

2. copy the host data to the device memory

3. if it is the first iteration, sorts subsequences of 1024 integers

int subseq = N * (1 << iter) * idx;

4. update grid size by half of lines

5. for the rest of the iterations, merges subsequences of twice the numbers of the previous subsequences

int subseq = 2 * N * (1 << iter) * idx;

6. all sequence is sorted, so copy back to the host data

7. validate the final sequence

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Sort Integers by Rows Problem - Results

- Timing Results for datSeq1M.bin.
- We execute the program 5 times and we calculate the results that are in the table.

running on	Mean Execution Time (s)	Standard deviation (σ)	Variation ($\sigma2$)
GPU	0.3555614	0.013662	0.0001866
CPU	0.5825498	0.005493	0.0000302

so, is it worthwhile to use the GPU to solve this kind of problem?

In this case, yes :)

Sort Integers by Columns – (Incomplete) Implementation

host

kernel

1. read binary file

2. copy the host data to the device memory

3. if it is the first iteration, sorts subsequences of 1024 integers

int subseq_idx = ((1 << iter) * idx) + (N * (i % N)) + (i / N);
int next_subseq_idx = ((1 << iter) * idx) + (N * (j % N)) + (j / N);

4. update grid size by half of columns

example of what we tried to do and fail

```
1  2  5   6            1   5
3  4  7   9            2   6
5  6  8  11            3   7
8  7 10  12    ➡       4   8
                       5   9
                       5  10
                       6  11
                       8  12
```

5. for the rest of the iterations, merges subsequences of twice the numbers of the previous subsequences

? the error is here, on calculating the indexes!

6. all sequence is sorted, so copy back to the host data

7. validate the final sequence