Assignment 1: Parallel-and -GPU-programming in Python

Background:

See course material[1]

Assignment:

Assume that we have an array of random elements. We would like to shift the elements by one to the left, known as left rotation operation. Below you can see an example of such operation:

Original array:

2	5	3	7	1	9	4	6

Array after left rotation:

5	3	7	1	9	4	6	2

As we can see each element in the original array is shifted to one location to the left. Please note that the first element is rotated to the end of the array.

Given the previous introduction, perform the following tasks:

- **Task1**: implement the left rotation operation in parallel in PyCUDA
- **Task2**: validate the GPU implementation with the sequential version of this operation on CPU;
- **Task**3: compare the performance between CPU and GPU implementations;
- **Raks4:** explain the observed performance differences between CPU and GPU.

- For simplicity, you can assume that we only have one thread block with N threads and the size of the array is also N (N <= 1024).

Submission:

Submit a short report in Canvas before the deadline, including the graphs and answers to the questions.
Note: Submitting after the deadline will result in losing points (1 point for every 30 minutes after the deadline)

[1] https://github.com/sara-nl/Parallel-and-GPU-programming-in-Python/tree/main/Day2Links to an external site.