

מחשוב מקבילי ומבוזר

תרגיל #8

The purpose of this exercise is to have experience with heterogeneous environment MPI + OpenMP + CUDA

Calculate the sum of the very large array of values using MPI + OpenMP + CUDA environment.

Requirements:

- Run two processes on two computers on VLAB.
- One of the processes reads a values from the text file "input.dat". This file contains in the first line integers **N** and **N** double values in the following lines. For example
4
0.2
-2
45.17
22
- This process will manage a half of the array, let call it **A**, other half of the array **A** it sends to the second process.
- The purpose of the application is to calculate the sum of array **B**:

$$B[i] = \max(\sin(A[i] * \cos(k))), \text{ for } k = 0, 1, 2, \dots, \text{MAX}$$

- Both processes use OpenMP and CUDA to manage their parts as described later. For example, if $N = 10000$, then the first process uses OpenMP for the first 2500 values of **A**, CUDA for the next 2500 values. The second process that received 5000 values will also manage first 2500 of its part with OpenMP and the rest with CUDA.
- The value of MAX has to be defined through arguments to main().

Grading Policy:

- **10 points** for code quality:
 - a. The code has to be divided into small functions (not more than 40 lines of code).
 - b. Use meaningful names for variables, functions, files, constants.

- c. Place enough comments to understand the code
 - d. No unused lines of code. Do not repeat the code – use functions!
 - e. Write README.TXT file if special instructions are needed to run the solution. The file must be in the root folder of the solution.
- **70 points** – for proper implementation of the requirements.
 - **20 points** – for Load Balancing
 - The Homework must be delivered in time. No delay will be accepted.

Important:

- The homework may be performed in pairs. **The whole project** have to be zipped and named as

11111111_22222222.zip

Where **11111111** is ID of the one student and **22222222** is Id of another student.

בהצלחה