# מחשוב מקבילי ומבוזר

## תרגיל #3

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

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

## Problem definition:

- Lunch two processes. One of the processes reads 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 this array **A** it sends to the second process.

- The purpose of the application is to calculate the sum of array **B**:

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

- Both processes use OpenMP to manage their parts as described later. For example, if N = 10000, then the first process uses OpenMP for the first 5000 values of **A**, and the second process uses OpenMP for the next 5000 values.

- The value of MAX has to be defined through arguments passed to main().

- Perform few runs with a supplied file input.dat, MAX = 10000 and fill the comparison table:

| Number of OpenMP threads for each MPI process | Execution time | Explain the results |
|---|---|---|
| 2 | | |
| 4 | | |
| 8 | | |
| 16 | | |

## 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 time measurement and comments on result obtained

- The Homework must be delivered in time. No delay will be accepted.

## Important:

- The Homework has to be tested under Ubuntu OS in VLAB. Perform runs from the terminal with Ubuntu images created from the different pools.

- Supply the whole compressed directory of your project.

- The Homework must be delivered in time. No delay will be accepted. It may be performed in pairs. *Only one member of pair* submits the solution through the Moodle.

- The whole solution must be zipped and named as

**111111111_222222222.zip**

Where **111111111** is ID of the one student and **222222222** is ID of another student

# בהצלחה!