13.03.2020

FATİH SULTAN MEHMET VAKIF UNIVERSITY

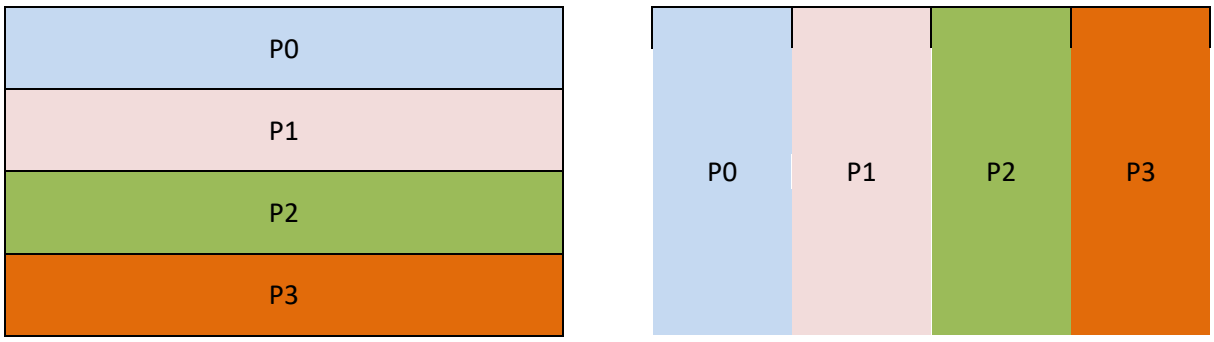
COMPUTER ENGINEERING DEPARTMENT

BLM19413E PARALLEL COMPUTING

HOMEWORK II

Aim: Implementing and analysing parallel matrix vector multiplication operation using MPI collective communication routines and derived datatypes

Comments: Parallel matrix vector multiplication (P-MVM) can be performed in two ways, which are row-based partitioning and column-based partitioning as follows:



Requested actions:

1. Write P-MVM codes using MPI API in C programming language for both of the approaches presented above.
    a. The first approach has already been written throughout the course. Add derived datatype (rowType) to the existing code.
    b. Implement second approach
2. Determine the communication time t_{comm}, computation time t_{comp} and Wall-clock time t_{wall} using `MPI_Wtime()` routine.
3. Compare the results obtained in 2. and discuss the efficiency of the approaches both. Fix the matrix size to 30000×30000 and measure the abovementioned times for $p = 1, 2, 4$ (and 8, if available) processes.

4. Matrix elements should be declared as `MPI_FLOAT`.
5. Prepare your codes as .c files and time measurements in a .pdf file. Zip and submit them as a single .zip file to the related moodle item.
6. Late submissions will be ignored.
7. The due time for the submission is 23:55 on 25.03.2020.