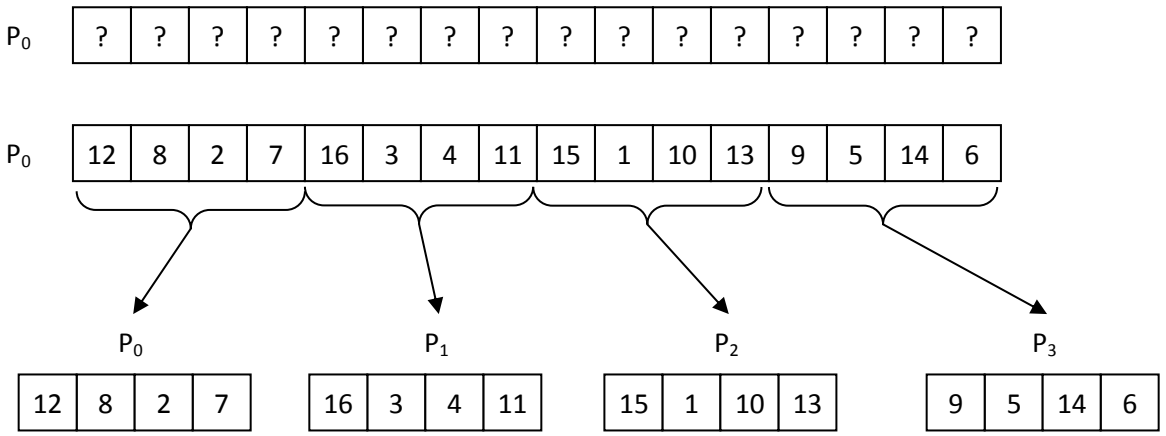
Laboratory 6

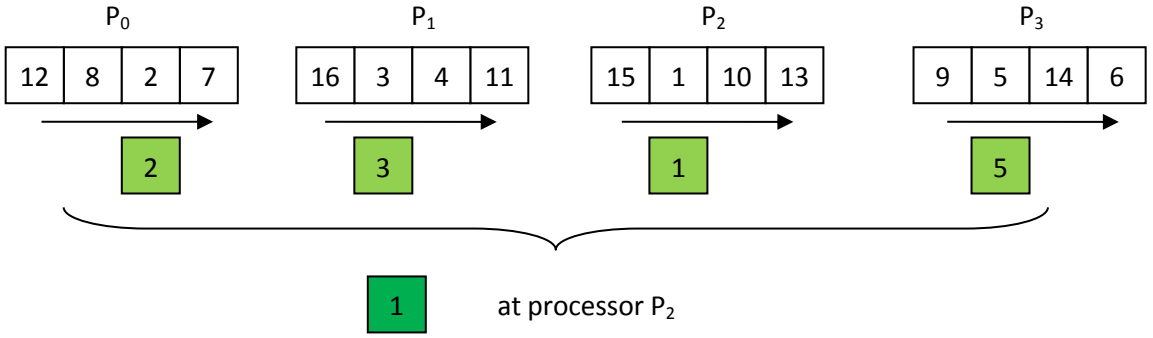
Implement a sorting by selection (Selection Sort Algorithm) using MPI. In the first step processor number 0 generates “n” random values (float) and then distributes them equally to “p” available processors, each processor receive “n/p” values. Then each processor begin sorting by selecting a minimum value – local minimum. When all processors find the local minimum the global minimum is select. During selection a global minimum you need to use MPI_AllReduce operation with the parameter MIN_LOC. More details are presented below. When sorting is complete processor 0 collects partial results from all processors and checks whether they are sorted.

Distributed sorting algorithm by minimum selection

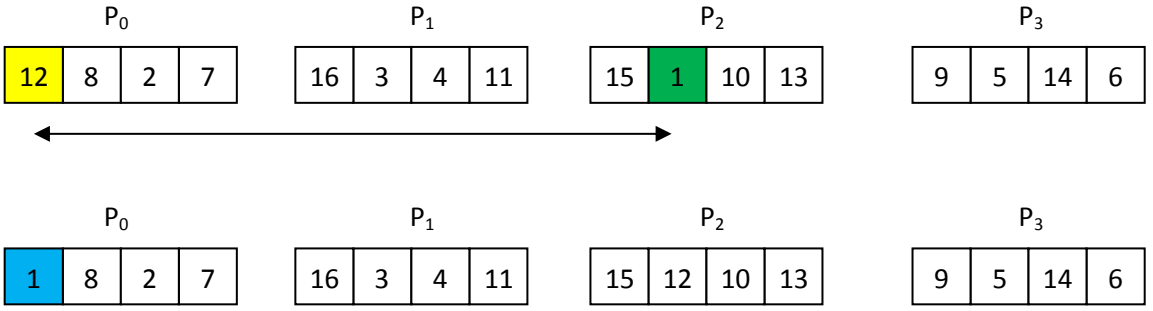
Initial phase: generating input values and its distribution among all available processor.



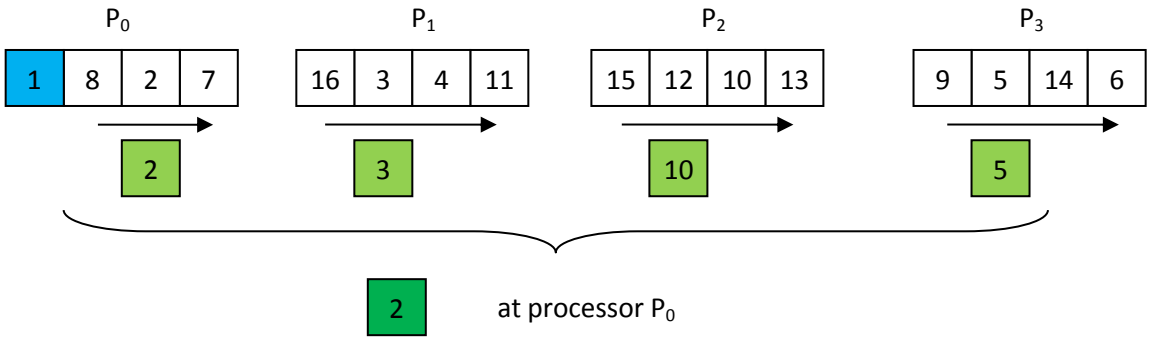
Algorithm – first step - selection of the local, and then the global minimum



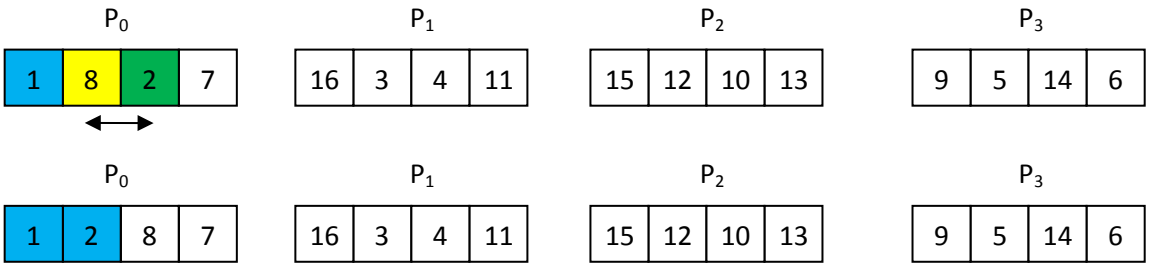
Algorithm – second step – exchange global minimum with the appropriate position



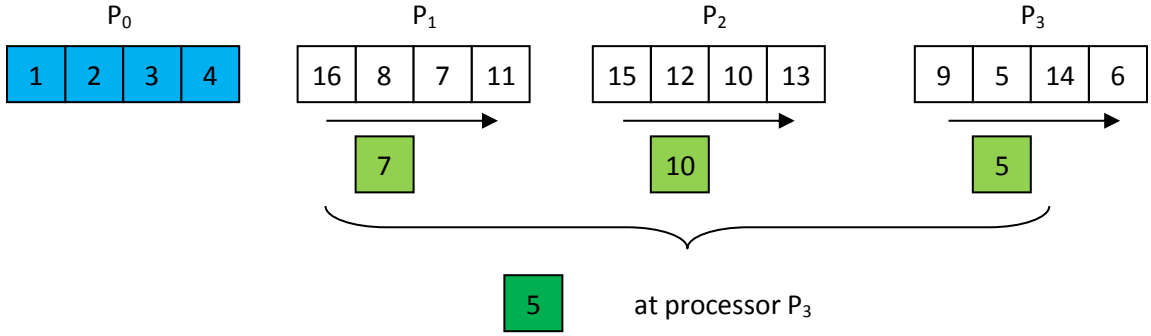
Algorithm – third step – selection of the local, and then the global minimum



Algorithm – fourth step – exchange global minimum with the appropriate position



After inserting properly 4 elements, the processor 0 is no longer involved in the processing



When the sorting process is finished processor 0 collects all partial results and checks if sorting is correct.