

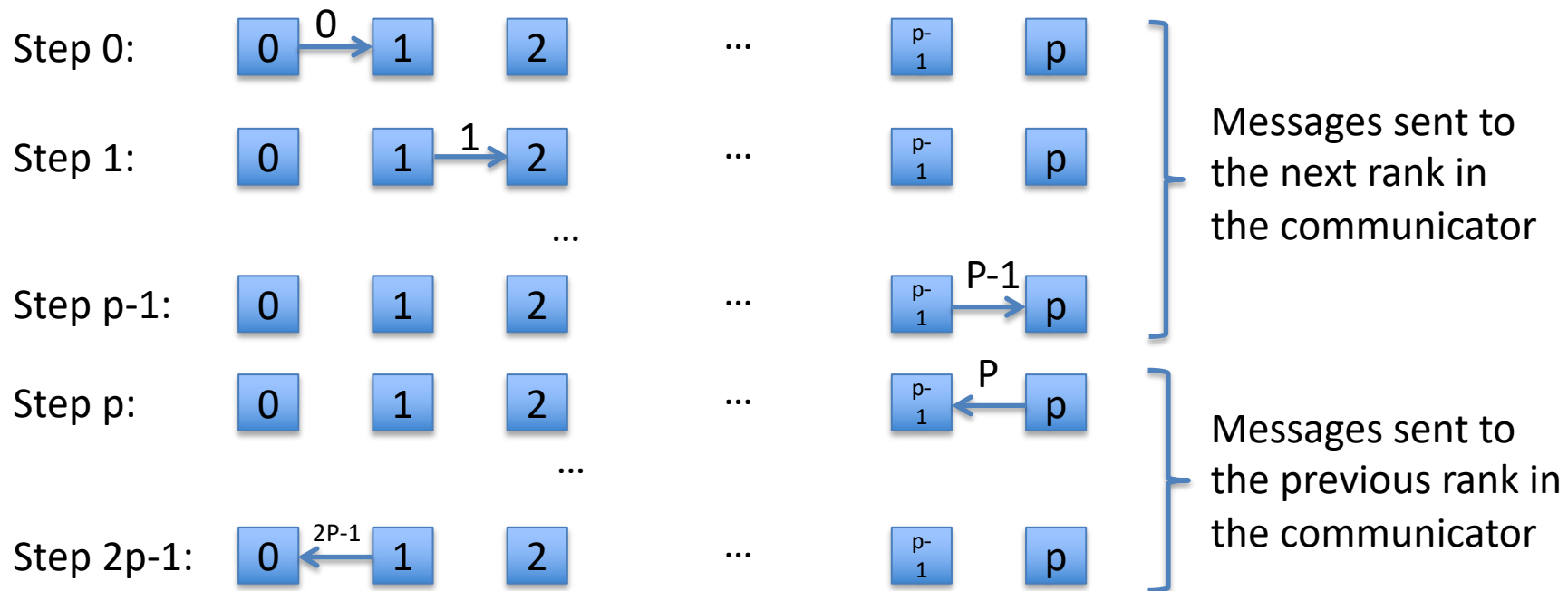
Homework 3

Message Passing hw #3

Deadline: Feb 5 2020

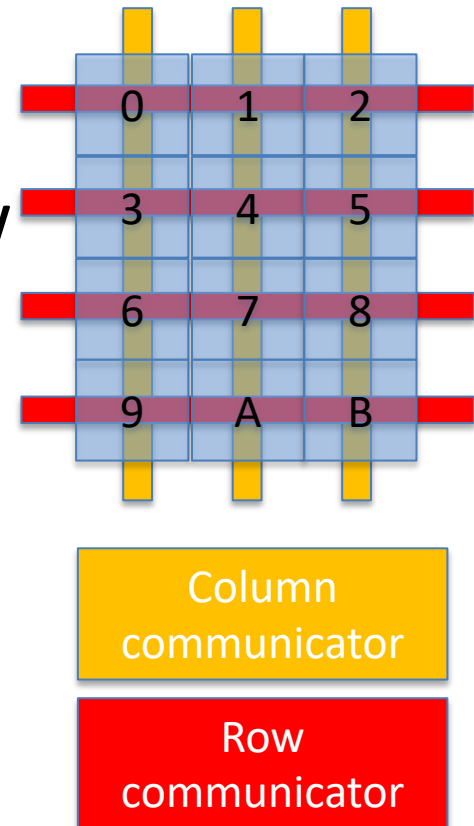
Ring Application

- Write a simple application that passes a token between all the processes in one communicator, from 0 to p and then back from p to 0 (where p is the number of processes in the communicator).



Process Grids

- Matrices are usually distributed using regular 2D block/cyclic distribution over a process grid of $P \times Q$ processes.
- Use the minimum number of MPI functions to create the row and column communicators (assuming P is provided) as indicated on the picture on the right



Multi-pipeline communications

- Merge the first and second part of this homework to create an example of application where everybody has a token originally and they pass it around in each dimension.
 - The tokens remains in their communicator: i.e. tokens received from the west are passed to the east at the next iteration, while the token received from the north are passed to the south at the next iteration (no change of direction)
 - How many steps we need to have a full exchange (e.g. every process have seen all tokens on it's row and column of processors).

Matrix Transpose

- The goal is to transpose a $N \times N$ row-major matrix stored over $P \times Q$ processors using a block,block distribution only relying on MPI functions (you need to use MPI functions for all operations).
 - Build the required datatypes and write the MPI application.

What to turn in

- Source code and a Makefile
 - Make sure the code works as expected (check it with bi/tri-diagonal matrices as an example)
- A pdf describing your findings.