

# Parallel and Distributed Computing: Homework 9

Due June 1, 2020, in pdf format on Canvas.

Consider a distributed computing system with 5 physical processors, running a workload of 6 SPMD jobs:

$J_1$ : has 4 VPs  
 $J_2$ : has 3 VPs  
 $J_3$ : has 4 VPs  
 $J_4$ : has 1 VPs  
 $J_5$ : has 7 VPs  
 $J_6$ : has 2 VPs

1. Using the framework for spatial and temporal scheduling presented in class, find an allocation (spatial schedule) that leads to a temporal fair schedule with a 0% idling ratio.
2. Suppose that after a number of temporal schedule time periods processor number 3 fails completely.
  - (a) Provide a NEW allocation (spatial schedule) on the remaining 4 physical processors, namely 1, 2, 4, and 5, such that a new temporal schedule is obtained with as small an idling ratio as possible.
  - (b) Attempt to provide a new allocation (spatial schedule) that uses the original 0% idling ratio as a basis and re-assigns the VPs originally allocated to physical processor number 3 among the other surviving processors. By only re-assigning VPs of the failing processor, migration delays are minimized.
3. Compare the cost in number of "migrating VPs" between the two options of item 2 above.