# Parallel and Distributed Computing: Homework 7

Due May 15, 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

Using the framework for spatial and temporal scheduling presented in class, a possible allocation/spatial schedule is shown below:

| | | | | |
|---|---|---|---|---|
| | | | | 6 |
| 6 | | | | 5 |
| 5 | 5 | | | 5 |
| 3 | 4 | 5 | 5 | 3 |
| 1 | 3 | 5 | 3 | 2 |
| 1 | 2 | 1 | 1 | 2 |
| $\pi_1$ | $\pi_2$ | $\pi_3$ | $\pi_4$ | $\pi_5$ |

Questions:
Assuming there is no VP migration,

1. From the above allocation derive a legal periodic temporal schedule. Clearly explain why your proposed temporal schedule is legal, give the number of cycles in its period and compute the schedule's idling ratio.

2. Try to find a new schedule (new or a modification of the given schedule) that has a better idling ratio, without making the schedule's period impractically large. Please explain clearly and show your work!

3. Is there a best periodic temporal schedule? That is a temporal schedule with a minimum idling ratio? If the answer is yes, do provide an example of such optimal schedule for this workload.

*Hint*: There are many right answers, but there are only a few best answers - can you find one of them?