Verification of Cyber-Physical System
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Exercice Sheet 6

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Exercice 1

(1)

The task A_x is always executable, but if x is even, it may be possible that A_x would never change again and only A_y is going to be executed. So A_x is not strongly fair.

That is an extreme case, if we assume that the extreme case would not appear, A_x is strongly fair, because it would always be executable and would always be executed in the future.

(2)

The task A_y would always be executable, but it may be possible that only A_x is going to be executed so A_Y would never be executed again.

That is an extreme case, if we assume that the extreme case would not appear, A_y would always be executable and would always be executed in the future.

(3)

The execution is weakly fair with respect to the task A_x, because A_x would always be executable, and (by assuming the extreme case won't appear) going to be executed.

(4)

The execution is weakly fair with respect to the task A_y, because A_y would always be executable, and (by assuming the extreme case won't appear) going to be executed.

Exercice 2

(1)

There is no garantee that the value of x would eventually exceeds 5 (the system could always execute the task $Process_2$ and never $Process_1$). In order to garantee that, we need to add a strong fairness for the task $Process_1$. We don't have to add any kind of fairness to the task $Process_2$ (if we have to, we could add a weak fairness for task $Process_2$).

(2)

There is no garantee that the value of x would eventually exceeds 5 (the system could always execute the task $Process_1$ and never $Process_2$). In order to garantee that, we need to add a strong fairness for the task $Process_2$ and a weak fairness to the task $Process_1$. So $Process_1$ would be executed at least one time and then y would increase in order to exceeds 5.

(3)

There is no garantee that the values x and y would become equal in the execution. In order to garantee that, we have to add a strong fairness assumption for both task $Process_1$ and $Process_2$. So it would exist an infinite amount of execution in which $x == y$ would holds at a certain time.