CMPS 396W - Homework 2

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1 Problem 1

We have two processes; and an initial state. Each process can have 3 different states

Ni: Neutral state where process i does not require critical section

Ti: Trying state where process i request entry to the critical section

Ci: Process i is in the critical section

We added F that relate to a flag.

In this problem we need to fix mutex to be live using Eshmun (done in Homework 1)

In addition to that our model needs to satisfy a new property which states that there exist a path globally where N1 always holds and N2 always holds (Homework 2).

EG(N1) & EG(N2)

This means that in my model There should exist a path where Process 1 is always in the Neutral state while Process 2 is alternating between Neutral, Trying, Critical states.

And the same case for Process 2: There should exist a path where Process 2 is always in the Neutral state while Process 1 is alternating between Neutral, Trying, Critical states.

Using Eshmun tool we need to solve this problem by making sure that our solution satisfies the liveness property, Mutual Exclusion and the third requirement of Homework 2.

In my solution I managed to satisfy the above two rules (Liveness and Mutual Exclusion) in addition to the requirement of Homework 2.

And my model was correct.

Example of a possible scenario that satisfy the requirement of Homework 2 specifically which is Process 2 stays in the Neutral State:

- S0: Initial State where both Process 1 and Process 2 are in the Neutral State.

- S1: In this State Process 1 is Trying, while Process 2 is in the Neutral State.

- S1_1: In this State Process 1 is Trying and the Flag is with Process 1, while Process 2 is in the Neutral State.

- S1_2_1: In this State Process 1 is in the Critical Section, while Process 2 is in the Neutral State.

- S0: Back to Initial State, And we can loop in this cycle for an infinite number of times.

This case is also available for Process 1 where it can stay in the Neutral State.

Please find inside the zipped folder an Eshmun file in addition to a screen shot of the Model.