

Formal Methods in Software Engineering

Computer Assignment 2

Due 22nd of Dey

Fathiyeh Faghieh
University of Tehran

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Please upload your models to the course webpage no later than 22nd of Dey, midnight. Whenever an explanation is needed, use commenting to add it to the model.

1. Consider 4 processes in a ring that pass a single token among themselves. When a process receives a token, it passes the token to one of its neighbors. Model this algorithm in SPIN, where a token is passed using channels. Check the following properties:
 - (a) In each step, no more than one process has the token.
 - (b) At least one process has the token infinity often.
 - (c) Every process has the token infinity often.

In another model, formulate the similar algorithm with the difference that each process always passes the token to its left process, and analyze the model with the same properties.

2. Consider an elevator system in a building with 3 floors. There is a button in each floor, which can be pressed to call the elevator. When the button on one floor is pressed, and no other button is already pressed, the elevator should start traveling to that floor. When more than one button is pressed at the same time, the elevator goes to the nearest floor. The buttons pressed during the travel time are ignored. Formalize this system in NuSMV, and check the following properties (make sure they are satisfied).
 - If there are no requests for another floor, the elevator should not move.
 - The elevator cannot change direction between floors.
 - Make your model satisfy the following property: The elevator visits every floor infinitely often.