Computational Models for Embedded Systems
Laboratory Assignment 02

Assignment 2: Model checking

Theoretical aspects
Model checking

Assignment Objectives
Verification using model checking.
JSpin

Assignments
Model checking Tool
Promela modeling and JSpin LTL properties.

Assignment 2

- **Assignment 2 -** SDG and UBB-Goes-Green – problem statement from Assignment 1
  - Solution: MC
- Sample Problem: A day in a life of … a parent and a child.
  - 2 actors: parent (P) and child (C)
  - At least 2 "signals" between the actors (from P to C and from C to P)
  - Example:
    - P and C both in "sleeping" state; P wakes up first and "signals" the C to wake up (thus, the C wakes up); P and C both "eating" state; C "signals" the P she/he finished the breakfast (P and C both "get dressed"); P "signals" the C to go to car (thus, C is in the state "in Car"), they both arrive to work/school in 30 minutes; after a period of time the C "signals" the P to come and pick her/him from school (thus the P picks her/him) and both go home; at home, P "signals" the C she/he has time to "play" (thus, the C comes and plays with the P); after a while the C "signals" the P to go to sleep (thus, they both go to sleep).
  - LTL formulas: "The P always waits for the C to finish breakfast before getting to car." or "The state after *school* is *home*", etc.
- Work in teams of 2-3 members.
- Task 01
  - Create, based on your findings and provided solutions, the Problem Statement for your first lab.
  - Remark: At least 2 "signals" between the actors (2 signals from actor1 to actor2 and 2 signals from actor2 to actor1)
    - Example: Recycle Paper Solution (this problem has only one signal between the actors)
      - Actors: Teacher (T), UBB-Recycle-Center (UBB-RC)
      - Signals: T to UBB-RC (haveExamPapersToRecycle) and UBB-RC to T (doYouHaveOtherPapers?);
- Task 02
  - Translate the problem (interactions) using JSpin model checker.
  - Write 3 LTL formulas and check them.

Turn in (for each Assignment 2):

(a) Problem statement in natural language (specify the actors, the signals and describe the interactions).
(b) Promela *.pml file with the solution.
(c) Write 3 LTL formulas and check them with the JSpin model checker.
(d) The output of the Spin model checker.
(e) An archive with all the above files must be submitted in Teams, under the Assignment 2 (the name of the archive: Name1Name2Name3_MC_2.zip

Assignment and Delivery date for Assignment 2:
1. Assignment date: laboratory 2
2. Delivery date (first): laboratory 4 (maximal grade 500XP: 100 XP for Task 01 and 400 XP for Task 02).
3. Delivery date (last): laboratory 7 (maximal grade 500XP: 100 XP for Task 01 and 400 XP for Task 02).

Remark: The solutions must be presented in class (during lab hours).