Real Time Systems
Assignment 4

Instructions

- Strict deadline is Jun 5th, 12:00. If you take the exam on May 21th, the deadline is May 21th (but in this case I will tolerate exceptions).
- Assignment must be delivered through IS (Homework Vaults), file name: login.zip or login.tar.
- The zip/tar file should contain an Uppaal model (.xml, .q files) and its description (.pdf file).
- You must work independently.
- You can use additional sources (e.g., web documents, BEEM model database) as an inspiration. In such a case, you should properly cite the source and clearly describe what is your own contribution.
- You can choose one of two following two options. It is sufficient to do only one of them.

Leader Election Protocol

Create a model of a "leader election protocol", i.e., a protocol used to select a single leader among a set of agents communicating via channels. You may choose any specific protocol, e.g., one of the protocols mentioned in the BEEM database (`http://anna.fi.muni.cz/models`), or you can even design your own protocol.

The model should contain some timing information (e.g., minimal/maximal transmition time). You should perform verification both with respect to functional requirements ("exactly one leader will be elected") and with respect to timing requirements ("leader will be elected within X time units").

Elevator

The goal of this task is to develop a simple Uppaal model of an elevator. The model must contain at least three processes and it must use clocks (in non-trivial way). You should also write several simple queries and check whether these queries are satisfied.

The exact details are up to you – it is an integral part of this exercise to think of a suitable way to construct an abstract model of a real system. Here you have just several suggestions (it is not necessary to follow these suggestions):

- Individual processes can represent: an elevator cabin, a controller (an algorithm for guiding the elevator), users, doors on each floor, ...

- Possible timing parameters: time to go from one floor to another, time to open doors, timeout for entering the elevator, ...
- Possible queries:
  - elevator can reach the third floor (withing x time units),
  - if the user calls the elevator then the elevator will eventually (withing x time units) reach the floor,
  - elevator can deadlock.
- It may be useful to employ urgent channels and urgent/committed locations (see Uppaal help).