UPPAAL Tutorial/Assignment

Formal Systems - Spring 2017-18

Coffee Vending Machine

The problem is to model the behaviour of a system with the following three interacting components:

- Coffee machine
- A Person
- An Observer

The *person* repeatedly tries to insert a coin, tries to extract coffee after which (s)he will make a *publication* (to indicate that the coffee is taken). Between each action the *person* requires a suitable time-delay before being ready to participate in the next one.

After receiving a coin the *machine* should take some time for brewing the coffee. The *machine* should time-out if the brewed coffee has not been taken before a certain upper time-limit. If multiple people exist in the world, then a person cant request for coffee from a specific machine unless that machine is free.

The *observer* should complain if at any time more than 8 time-units elapse between two consecutive *publications*.

Submission Types:
You will be graded on the following types of submissions, where each submission is at an increased level of complexity:

Basic	:	There is one coffee machine, one person and one observer instance. Here there is no need to design accounting for multiple instances of *person*, *observer* or *machine*
Advanced	:	There is one coffee machine, any number of people (say N, an input), and one observer instance.
Extra Credit	:	There are many coffee machines (say M), any number of people (say N), and an observer per coffee machine.

You must submit the following for this assignment:

1. A single *report* on the design of the timed automaton, explaining what locations you use for each component, the variables, clocks and synchronizing actions.
2. *The UPPAAL Timed Automata Model Files*
3. Note the the specification uses the phrase: "The Machine should time-out if the brewed coffee has not been taken before a certain upper time-limit". This phrase is worrying because it is an under-specification of the system. For example: "What does the machine do if it times out?"

   In the report clearly explain the design decisions you make to resolve such ambiguities.
4. In the report provide *a list of query LTL formulas you have used to verify the model* you built. It's alright if properties fail. If there are any properties (you have specified) that fail, explain through reason why they failed.

Everyone must submit the **Basic** and **Advanced** versions of the system.

Submission Dates (SUBMIT BY E-MAIL TO: antonio@iitkgp.ac.in):

Basic: 15^{th} April (End of Day) *[Only Timed Automata Model Files]*

Advanced + Extra Credit: 29^{th} April (End of Day) *[Report (containing design decisions, explanations and properties), Model Files]*