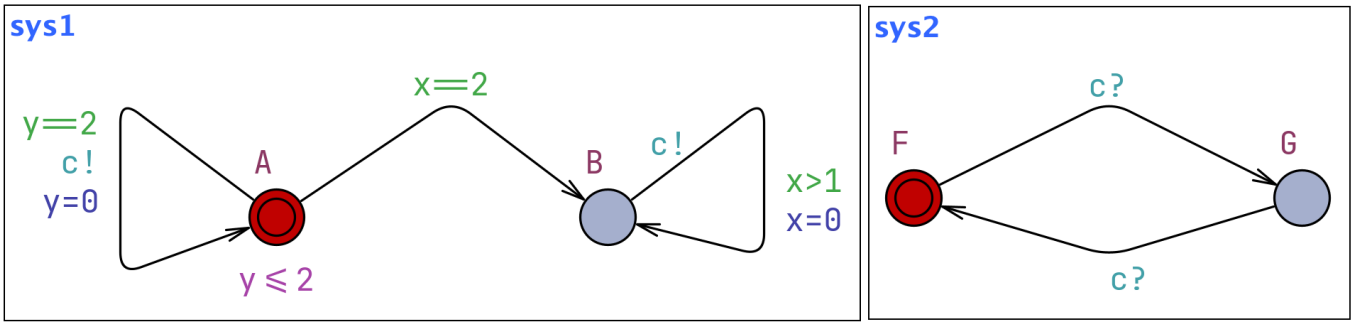
ECE522/622, Problem Set 2, SP25, Holcomb

This problem set prepares you for lab 2 by introducing the UPPAAL tool. To complete this assignment and lab 2, you will need to install version 5.0.0 of UPPAAL from http://www.uppaal.org/. The website has tutorial documents, and detailed descriptions of how to use UPPAAL. You will need to enter a license key when you first run UPPAAL. The license key for our class is posted on Canvas. The UPPAAL tool comes with several example models to explore and use as a reference when creating your own models.

After setting up UPPAAL, create the model shown below, of a system with two processes (*sys1* and *sys2*) and a communication channel *c*. Your model must include the location invariants, guards, and updates as shown.



The following two target conditions each describe points in the state space of the system. Use UPPAAL to check whether each condition is reachable, and to understand how UPPAAL performs its search using clock equivalence regions.

Condition 1:
- sys1 is in location B; and
- sys2 is in location F; and
- clock x has value 1; and
- clock y has value 1

Condition 2:
- sys1 is in location B; and
- sys2 is in location G; and
- clock x has value 1; and
- clock y has value 1

1) Use UPPAAL queries to check whether each of the conditions is reachable from the initial condition of the system. On your homework submission, write the query you used to check reachability of each.

2) For each condition that you find to be reachable, find the shortest possible path (i.e. fewest jumps) from the initial condition to the target condition. For each jump on that path, provide the following information:
   a. Does sys2 change its location during the jump? If so, what is the starting location and ending location of the jump?
   b. What are the values/regions of the clock variables when the jump occurs? Include a plot to annotate these values/regions, as we've done in module 3. In your plot, x should be the horizontal axis and y should be the vertical axis.

Submit your assignment by uploading two files to Canvas:

1) Your UPPAAL model file, named as `<lastname>.xml` (e.g. `holcomb.xml`), including the queries
2) Your answers to the questions above as a pdf, named as `<lastname>.pdf`. The plots in your pdf can be hand-drawn if written clearly.