Cyber-Physical Computation

First Assignment – the case of an airfield

Renato Neves

Consider a private airfield used by 2 planes, which can be either flying, parked, landing, or taking off. The landing field is a resource shared by the two planes, and the following requirements must be met:

1. only 1 plane can use the landing field at a time;
2. a Controller component receives requests to *land* or to *take off*, and replies with a *wait* signal when the field is unavailable;
3. each plane sends requests to the Controller to *land* or to *take off*, and sends notifications when the field becomes *free*;
4. the Controller has 5 time units to notify a plane to wait;
5. after 5 time units from requesting access to the field and with no wait signal, the planes take another 5 time units to reach the field;
6. each plane takes non-deterministically between 1-3 time units to take off, and between 4-6 time units to land and park;
7. after taking off and after parking the planes notify the Controller with a *gone* signal;
8. if a plane is told to wait, we assume it will take between 5-7 time units to reach the field.

Suggest a Uppaal model for the planes and the controller. List 4 to 8 desired properties that the model should satisfy. Verify the properties via Uppaal.

Extra points: Extend your model to handle n planes at once. Can you think of other useful features that the airfield should have? If so please discuss them and describe how would you model them.

What to submit: A single report in PDF for all tasks **and** all the relevant source files. Send by email (nevrenato@gmail.com) a unique zip file "`cpc2425-N.zip`", where `N` is your student numbers. The subject of the email should be "`cpc2425 N first assignment`".

Deadline: 10th April 2025 @ 23h59