

MTAT.03.083 – Systems Modelling

Petri nets homework

Due on Friday 17 April.

Please return your homework by e-mail to: Marlon dot Dumas ät ut dot ee.

You may complete the homework in groups of up to 4 students.

Population dynamics (2 points)

Design a Petri net to capture the population dynamics of humans in an island. Initially a certain number of people arrive to the island. This initial population evolves according to the usual birth and death processes. In particular, an adult man and an adult woman can have a child (sometimes even twins or triplets). Children can not procreate nor can older women (after a certain age). People can die at any age.

You should write down any assumptions you make and provide enough textual explanation for someone familiar with Petri nets to understand your model. Feel free to decorate the places in the Petri net with pictures to enhance the understandability.

Traffic junction (3 points)

Model a section of Tartu's city centre using Petri nets. The section of the city centre that you choose must include at least 3 junctions with traffic lights and at least 2 junctions with pedestrian lights. Include a picture showing the section of town you chose to model. Make sure that when modeling junctions with traffic lights you include traffic lights for pedestrians in addition to the traffic lights for vehicles. Try to synchronize the traffic lights in such a way that cars travelling along a main road can circulate better. For example, if your network includes two consecutive traffic lights along Riia mnt, these two traffic lights should be synchronized in such a way that when an average car gets a green light at the first traffic light and arrives to the next traffic light, it does not have to stop again at the second traffic light. Write down any assumptions you make and provide sufficient textual explanation for someone familiar with Petri nets to understand your model. Feel free to decorate the places/transitions in the Petri net with pictures to enhance the understandability. You might get some ideas from the following paper: <http://www-rocq.inria.fr/metalau/quadrat/transportRR.pdf>