

# PRACTICAL WORK PART 2 ADVANCED CONCEPTS

## Contents

1	On the Interest of Symmetries	1
2	Back to the Swimming Pool	1
3	The Salestore Model	1



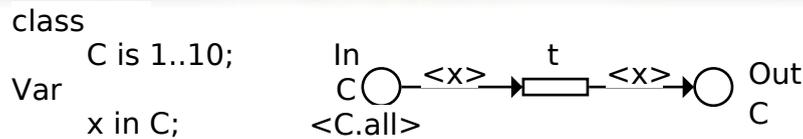


Figure 1: A simple SN.

## 1 On the Interest of Symmetries

Consider the very simple SN shown in Figure 1.

Build its RG, then its SRG. Compare their sizes. Rank from 1 to 10 the interest of symmetries to reduce the size of a state space.

## 2 Back to the Swimming Pool

Consider the swimming pool model you built earlier this morning.

**Question 2.1: Symmetries Again.** If all guests are behaviourally equivalent, the guest colour class is fully symmetric. Build the SRG of the model, and compare its size to the one of the RG.

**Question 2.2: Breaking Symmetries.** We now consider two kinds of guests: children and adults. Children bathe in the small pool, and adults in the large pool. As a simplifying hypothesis, we assume that children have identifiers less than 3 (out of 6 potential guests). The only difference between children and adults is the pool in which they bathe (otherwise there are identical). Modify your model so as to capture children and adults behaviours (you may find transition guards useful). Build the RG and the SRG of your new model. Compare with previous values. Does the SRG achieve the same reduction factor as previously?

## 3 The Salestore Model

The Université Libre de Bruxelles wants to model the behaviours of its guests in the goodies shop. As a starter, we consider that a guest can only buy one gift.

**Question 3.1: Modelling the System.** Design a SN with three places: one for idle guests, one for gifts in the shop, and one for guests associated with the gift they bought. There is a single transition that models purchases.

**Question 3.2: Rich Guests.** Now the guests can buy one or two gifts. Adapt the previous model so as to capture this new behaviour. How does it influence the structure of the net? Do you consider building a model where guests can buy up to 30 gifts?

**Question 3.3: A New Approach.** Reconsider the previous question, using bags of gifts to represent the gifts bought by a single guest. Do not forget to bound the maximal size of a bag of gifts. How does it impact the structure of the net?

**Question 3.4: Unfolding.** Consider the models with and without bags. What do you think of the term unfolding with respect to the bags?

**Question 3.5: State Spaces.** Now that you are convinced that the models with bags have equivalent models without bags, build the RG and SRG of the SN and SNB versions (for 2 or 3 gifts max per guest). What do you conclude?

**Question 3.6: Demanding Guests.** Guests may be very demanding, and now some of them enter the shop and leave without buying anything. How can you model this new behaviour with SN? How can you model this new behaviour with SNB?