

CS 376 : Assignment 6

Modeling and Simulation of Petri Nets

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1 Introduction

A tourist agency is setting up boat sightseeing tour where the boats are autonomous vehicles. You have been employed by the agency to design a control system that drives the boat along the channels as described in the following map.

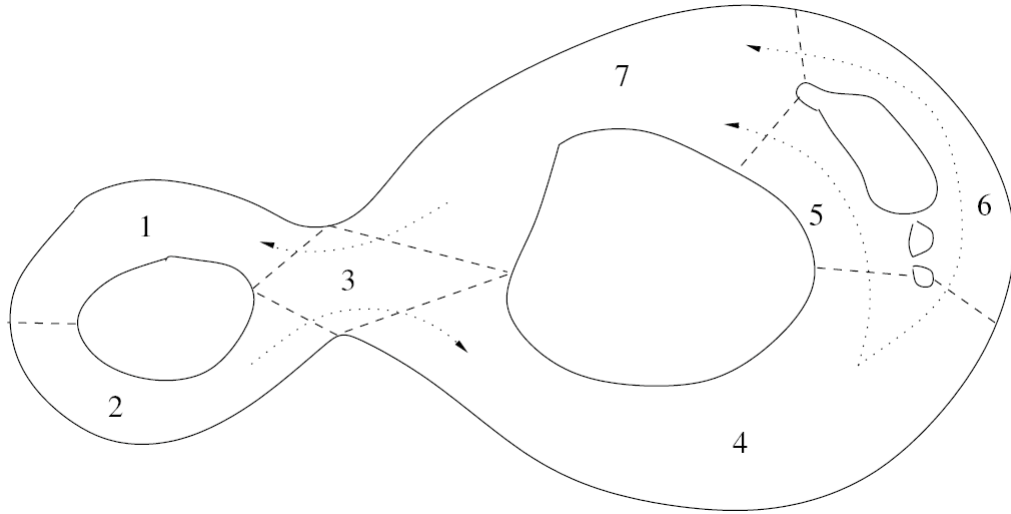


Figure 1: Boat Tour

The channel, Figure 1, has been divided up into regions. In the Petri-nets, Figures 2 3 and 4, the places with names following the pattern P represent these regions. The exception to this rule is the $P3A$ and $P3B$ places which represent region 3. In that case the place represents the path through the region with

$P3A$ representing the lower path and $P3B$ representing the upper path. The transitions are named based on the boundaries between the regions T where the first digit is the start region and the second digit the destination. A token in any of these places represents a boat. Tokens in other places represent permission (not boats).

2 Single Boat Indeterminate Path

Model the problem of a single boat with a Petri net and describe in detail what each place and transition represents

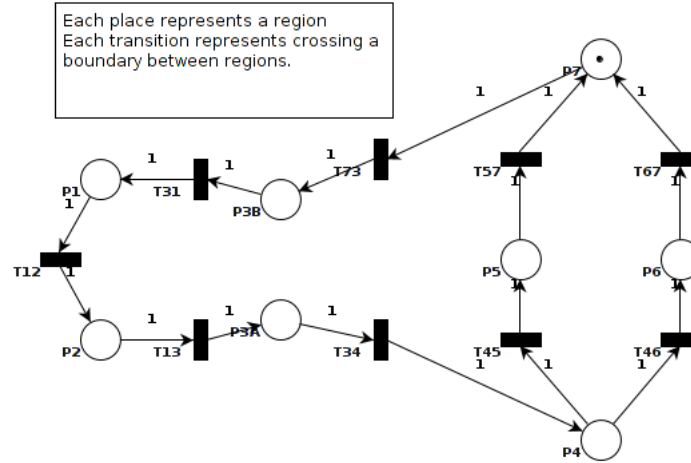


Figure 2: Single Boat with Indeterminate Path

This produces an indeterminate path as when there is a token in $P4$ both $T45$ and $T46$ are enabled.

3 Single Boat Determinate Path

The tourist agency wants the boat to pass alternatively through region 5 and 6. The Petri net in Section 2 is modified so that this constraint is satisfied.

This is done by introducing a pair of places, $P- > 5$, $P- > 6$ and a token. The token acts as a permit for the boat to enter either $P5$ or $P6$ depending on whether it is in place $P- > 5$ or $P- > 6$.

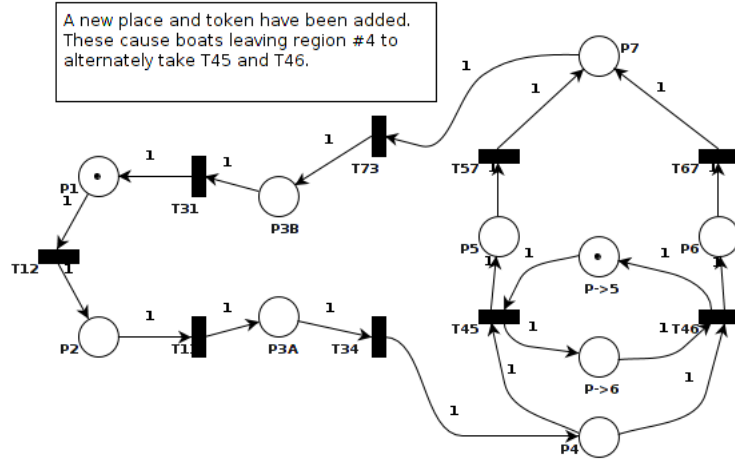


Figure 3: Single Boat with Determinate Path

4 Two Boats Place Exclusion

There are two boats. This Petri-net models a system like that of Section 3 but it additionally only allows one boat to access region 3 at a time.

This is done by introducing a place, $PX3$ and a token. The token acts as a permit for the boat to enter $P3A$ or $P3B$. Recall that these two places represent one region. For this reason the two places compete for the net token.

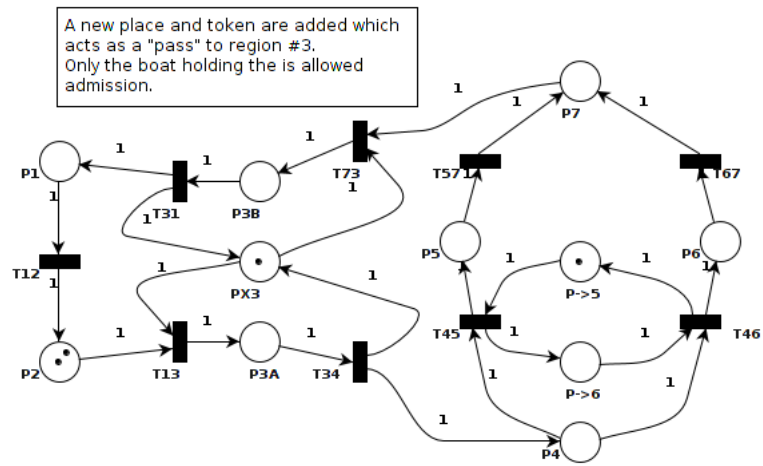


Figure 4: Two Boat with Exclusion Zone and Determinate Path