

# Exercises in Uppaal

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## 1 Cannibals and Missionaries

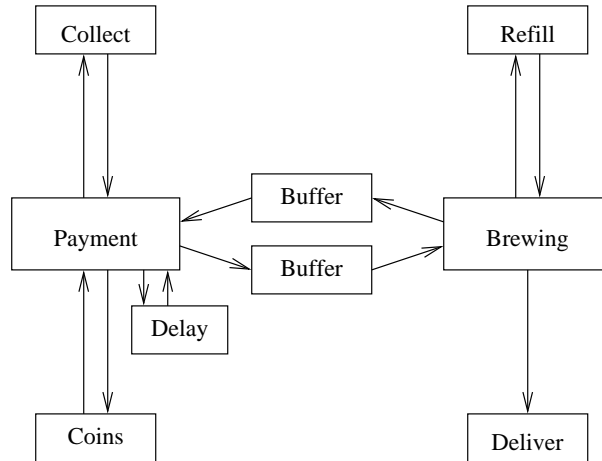
Three cannibals and three missionaries are traveling together and arrive at a river. To cross the river, they have to use a boat that can contain at most two persons. If in any location (river bank at either side or boat) there are more cannibals than missionaries then the missionaries will be eaten.

The task is to get the whole group across the river alive.

1. Write an Uppaal model of this problem.
2. Write a formula that expresses succesful completion of the task.
3. Deduce a solution by checking with diagnostic trace set to shortest.

## 2 coffee machine

The division of the whole system into processes could be something like



where

**Payment** Responsible for handling messages in KAS.

**Delay** Responsible for restarting the delayed execution of returning money.

**Coins** Inserting coins and receiving money back.

**Collect** Extracting the payment for coffee.

**Buffer** Buffering messages between Payment and Brewing (ZETTER). Please note that to support the various types of messages in buffers, you can easily encode the message type into an integer.

**Refill** Resupply of the machine with coffee beans and water.

**Deliver** Actual delivery of cups of coffee.

Please note that to make the system work, you will need a much smaller limit on the amount of coffee (5 instead of 1000) and you will need to limit how many times per second, coins can be inserted, money can be extracted and coffee can be refilled.