

LAB 1

Write a program, in a language of your choice, to provide the solution(s) of the problem „*The man, wolf, goat, cabbage*”. The problem will be described in terms of a finite automaton.

The *man, wolf, goat, cabbage*-Problem

- A man who has a wolf, a goat, and a cabbage has to cross a river in a boat that is only large enough to carry him and one of the other three.
- If he leaves the wolf and the goat unattended, there won't be a goat anymore when coming back.
- If he leaves the goat and the cabbage unattended, no cabbage will be left when he comes back.
- Is it possible to cross the river without losing any of the three and how?

The Alphabet

The alphabet that we use contains the letters m, w, g, c indicating that

- m: The man crosses the river on his own.
- w: The man crosses the river together with the wolf.
- g: The man crosses the river together with the goat.
- c: The man crosses the river together with the cabbage.

About this Automaton

- All words accepted by this automaton represent a solution to the *man, wolf, goat, cabbage*-problem in the sense that each of them represents a sequence of river crossings that leads to the desired result.
- The minimal solutions are the two shortest words accepted by this automaton:

The States

We describe a state using the capital letter M, W, G, C to denote the man, the wolf and the goat respectively.

A state $MW-GC$, for instance, describes the situation that the man and the wolf are on one side of the river and the goat and the cabbage is on the other.

What we want to know is whether we can find an automaton description starting in state $MWGC$ and ending in state $GMWC$ that avoids “forbidden” states.

How Do We Start?

