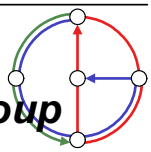
ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Distributed Computing Group



HS 2009 Prof. Dr. R. Wattenhofer / Jasmin Smula / Raphael Eidenbenz

Discrete Event Systems
Exercise 1

1 Finite Automata

In this exercise you are asked to design your first finite automata. Try to minimize the number of states of your machines.

a) Consider the alphabet {0,1}. Implement an automaton which accepts the following strings: At first there is an arbitrary number (possibly zero) of 1's, followed by arbitrary number of 0's. This in turn is followed by an arbitrary number of 1's. The final character of the string must be a 1.

b) Design an automaton which decides whether a number is divisible by three. Assume that the digits of the number are inserted sequentially, that is, the number '135' is inserted as '1', '3' and finally '5'. How many states do you need? (Hint: Cross sum!)

2 Vending Machine Revisited

Consider the vending machine shown on slide 1/6. Do you see any problems with this machine? How can the machine be made more user-friendly?

3 "Mais im Bundeshuus"

It's Wednesday morning and the seven members of the Swiss Federal Council meet to decide about an important topic: In order to decrease the expenses of education, should only women be allowed to study at ETH?

a) Assume that the seven members vote one after another. Further, assume that there is no abstention of voting. Design an automaton which accepts the ballot if and only if the majority of the members voted in favor of the proposition.

b) Extend your automaton for the case of abstentions of voting.