

Membrane Computing Systems and X-machines

P. Kefalas¹ I.Stamatopoulou¹ M. Gheorghe² G.Eleftherakis¹

¹Department of Computer Science, CITY College

13 Tsimiski str., 54624, Thessaloniki, Greece

`istamatopoulou@seerc.org`

`{kefalas, eleftherakis}@city.academic.gr`

²Department of Computer Science, University of Sheffield

Regent Court, 211 Portobello str., Sheffield S1 4DP, UK

`M.Gheorghe@dcs.shef.ac.uk`

Abstract

1 Introduction to X-machines

X-machines, a state-based formal method introduced by Eilenberg [8], are considered suitable for the formal specification of a system's components. More particularly, Stream X-machines were found to be well-suited for the modelling of reactive systems. Since then, valuable findings using the X-machines as a formal notation for specification, communication, verification and testing purposes have been reported [9, 11, 14]. An X-machine model consists of a number of states and also has a memory, which accommodates mathematically defined data structures. The transitions between states are labelled by functions.

Definition 1.1 A *deterministic stream X-machine* [11] is an 8-tuple

$$\mathcal{X} = (\Sigma, \Gamma, Q, M, \Phi, F, q_0, m_0)$$

where:

- Σ and Γ are the input and output alphabets, respectively.
- Q is the finite set of states.
- M is the (possibly) infinite set called memory.