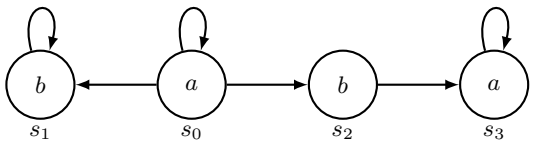
VU Programm- und Systemverifikation
Homework: Temporal Logic and Model Checking

May 14, 2014

Consider the following Kripke Structure:



1. Fix s_0 as the initial state and give the computation tree for three steps.
2. Describe the following formulas in natural language. For each formula, in which states of the Kripke structure does it hold? (Note that we do not consider s_0 as special initial state here.)
   (a) ~~$b \wedge \mathbf{X}\, a$~~ A (b ^ X a)
   (b) $\mathbf{A}\,\mathbf{G}\,(a\,\mathbf{U}\,b)$
   (c) $\mathbf{E}\,(\mathbf{G}\,b)$
   (d) $\mathbf{A}\,(\mathbf{G}\,\mathbf{F}\,a)$
3. Encode the following statements in temporal logic using the propositions given in quotes:
   (a) In all runs, a process is "scheduled" infinitely often.
   (b) There is a run in which from some point on the light is "red" forever.
   (c) There is a run where the speaker "beeps" at least five times in a row.
   (d) In all runs, if the submarine "dives", it later "surfaces".
   (e) The plane never "crashes".

Upload a pdf file with your solutions to TUWEL by May 29, 2014.