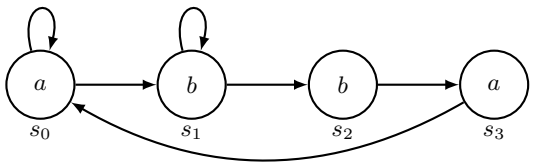
VU Programm- und Systemverifikation
Homework: Temporal Logic and Model Checking

(15 points)

June 5, 2017

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) $a \wedge \mathbf{X}\, a$
   (b) $\mathbf{A}\,\mathbf{G}\,(b\,\mathbf{U}\,a)$
   (c) $\mathbf{E}\,(\mathbf{G}\,a)$
   (d) $\mathbf{A}\,(\mathbf{G}\,((\mathbf{F}\,\neg a) \rightarrow \mathbf{F}\,b))$
3. Encode the following statements in temporal logic using the propositions given in quotes:
   (a) The sun "rises" infinitely often.
   (b) It is always the case that if the "sun" is shining, then it is not "dark".
   (c) One does not make the same "mistake" twice in life.
   (d) Austria "wins" the song contest five times in a row. (Every step takes one year).
   (e) Whenever Austria "wins" the song contest, it will be "hosted" in Austria the year after. (Every step takes one year).

Upload a pdf file with your solutions to TUWEL by June 10, 2015.