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LEHRSTUHL FÜR INFORMATIK 2
RWTH Aachen · D-52056 Aachen · GERMANY
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Introduction to Model Checking
Winter term 2011/2012

– Series 12 –

Hand in on January 25th before the exercise class.
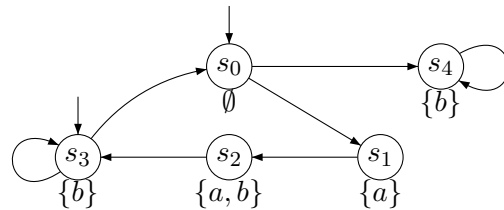
Exercise 1 (4 points)

Consider the following CTL formulas and the transition system TS outlined on the right:

$$\Phi_1 = \forall(a\,U\,b) \vee \exists\bigcirc(\forall\Box b)$$
$$\Phi_2 = \forall\Box\forall(a\,U\,b)$$
$$\Phi_3 = (a \wedge b) \rightarrow \exists\Box\exists\bigcirc\forall(b\,W\,a)$$
$$\Phi_4 = (\forall\Box\exists\Diamond\Phi_3)$$

Give the satisfaction sets $Sat(\Phi_i)$ and decide whether $TS \models \Phi_i$ holds ($1 \leq i \leq 4$).

Exercise 2 (2 points)

Transform the CTL-formula $\Phi = \neg\forall\Diamond\big(\forall\,(\forall\Box b)\,U\,(\forall\bigcirc a)\big)$ into an equivalent CTL-formula in

(a) existential normal form and

(b) positive normal form.

Exercise 3 (4 points)

Consider the following CTL-formulas

$$\Phi_1 = \exists\Diamond\forall\Box c \quad \text{and} \quad \Phi_2 = \forall(a\,U\,\forall\Diamond c)$$

and the transition system outlined on the right. Decide whether $TS \models \Phi_i$ for $i = 1, 2$ using the CTL model checking algorithm from the lecture. Sketch its main steps!