Exercises PV: LTL Model Checking

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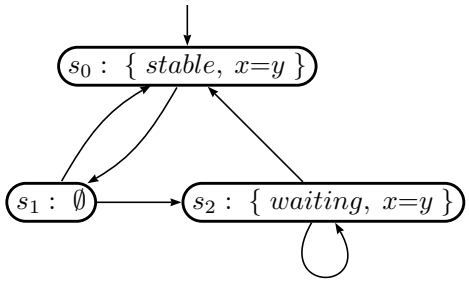
1. Consider the Kripke structure K depicted below. The states are $\{ s_0, s_1, s_2 \}$, with s_0 as the innitial state. We use $Prop = \{ stable, waiting, x{=}y \}$. Which propositions hold (and otherwise) at each state can be seen below.



   Consider the property $\phi = \Diamond\Box(x{=}y)$.

   (a) What does the formula say?

   (b) What is its negation?

   (c) Give a Buchi automaton $A_\neg$ that represent this negation.

   (d) Construct the automaton $K \cap A_\neg$.

   (e) So, does K satisfies the property ϕ?

2. Verify if following properties are valid properties of K from No. 1:

   (a) $\Box\Diamond(x = y)$

   (b) $\neg waiting\ \mathbf{U}\ (waiting \wedge x{=}y)$

3. What does this formula $\phi = \Box(waiting \rightarrow (waiting\ \mathbf{W}\ stable))$ say? Verify if it is a valid property of K.