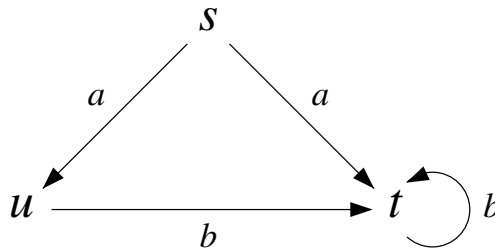


2009 Paper 9 Question 14

Topics in Concurrency

- (a) (i) Describe the modal μ -calculus and its semantics. [4 marks]
- (ii) Describe how to express maximum fixed points $\nu Y.A$ in terms of minimum fixed points. [1 mark]
- (b) (i) Describe an algorithm to determine whether a state in a finite-state transition system satisfies an assertion in the modal μ -calculus. [4 marks]
- (ii) Explain briefly why the algorithm always terminates. [3 marks]
- (iii) Use the algorithm to determine whether or not the state s in the labelled transition system below satisfies the assertion $[a]\nu Y.(\langle b \rangle T \wedge [b]Y)$, where T stands for “true”.



[6 marks]

- (iv) Describe, without proof, the meaning of the assertion from the modal μ -calculus in part (b)(iii) above. [2 marks]