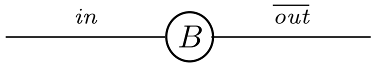
1996 Paper 7 Question 12

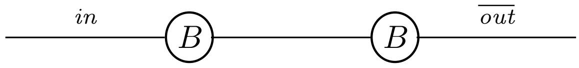
Communicating Automata

Define the notion of *weak bisimulation* over a labelled transition system. [3 marks]

A one-cell buffer B can be defined by $B \stackrel{\text{def}}{=} in.B'$, $B' \stackrel{\text{def}}{=} \overline{out}.B$ (the content of messages being ignored).



Define the linking operator $\frown$, in terms of basic operators, so that $B \frown B$ represents two buffer cells in sequence.



[3 marks]

Derive $B \frown B \xrightarrow{in} B' \frown B$ from the basic transition rules, and draw the complete transition graph of $B \frown B$. [3 marks]

A lossy buffer cell L (like B except that it may lose messages) can be defined by $L \stackrel{\text{def}}{=} in.L'$, $L' \stackrel{\text{def}}{=} \overline{out}.L + \tau.L$. Draw the complete transition graphs of both $B \frown L$ and $L \frown B$. [4 marks]

Show that $B \frown L \not\approx L \frown B$, by considering the state $L \frown B'$ (accessible from $L \frown B$) and showing that no appropriate state of $B \frown L$ can be observation equivalent to $L \frown B'$. [4 marks]

Is $L \frown L \approx B \frown L$ true? Outline an argument to prove or disprove it. [3 marks]