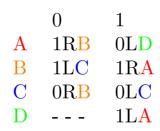
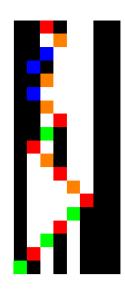


(a) 10,000-step space-time diagram of the 4-state Turing machine given in (b) from the all-0 initial configuration. The machine does not halt from the all-0 configuration.

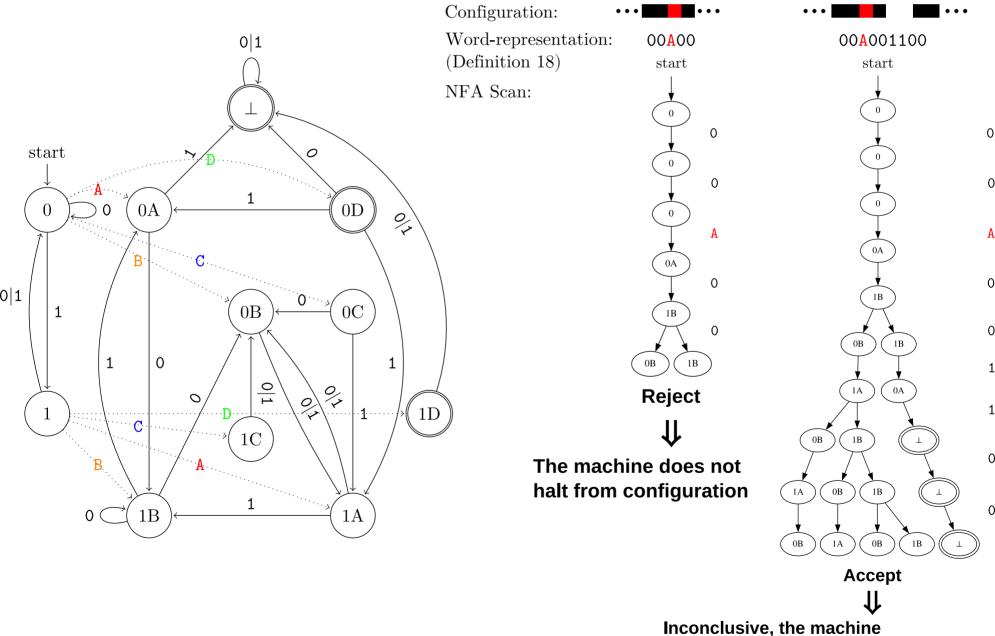


(b) Transition table.



(c) Detailed space-time diagram of the Turing machine given in (b) from an eventually-halting configuration: the machine halts after 18 steps by reading a 0 in state D.

potentially halts from configuration



(d) Left: Nondeterministic Finite Automaton for the Turing machine given in (b), constructed using FAR direct algorithm, see Section 6.3. By construction, if this NFA rejects a configuration, then we know that the configuration does not eventually halt, see Theorem 20. Right: The NFA rejects (i.e. no NFA accepting state is reached) the all-0 configuration, the machine does not halt from it. The NFA accepts (i.e. at least one NFA accepting state is reached) the starting (or any) configuration shown in (c) hence we cannot conclude that it is non-halting, which is consistent since it eventually halts.