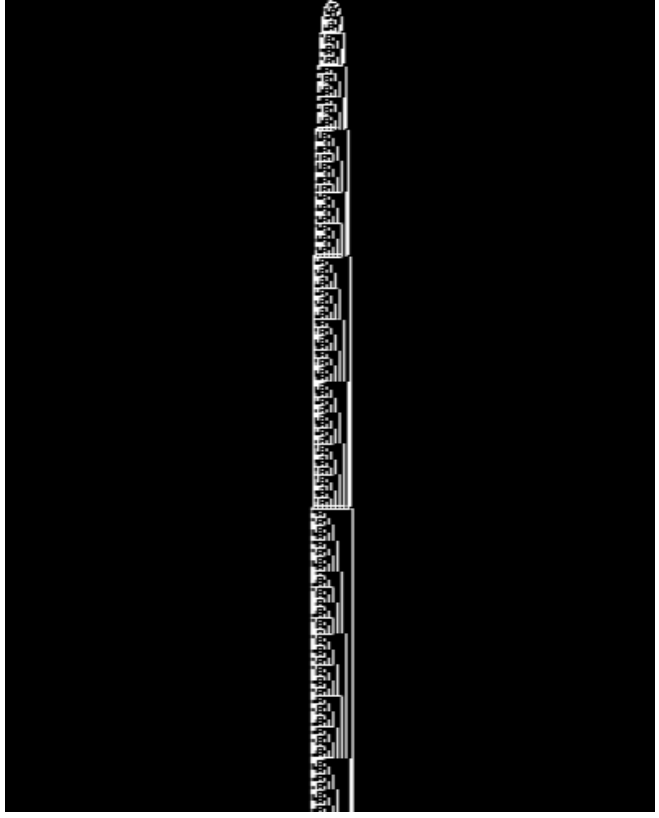
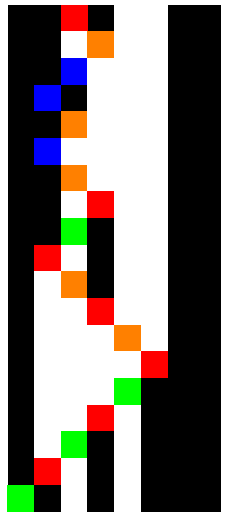


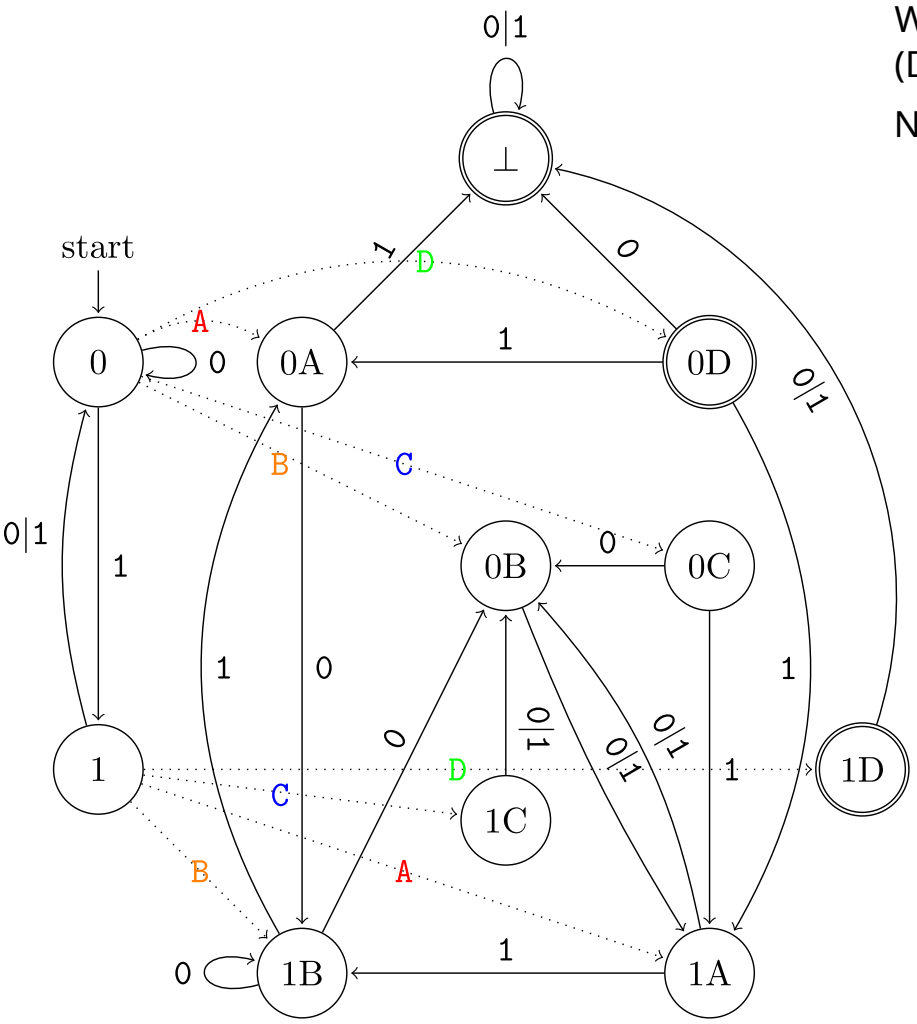
(a) 10,000-step space-time diagram of the 4-state Turing machine given in (b) from the all-0 initial configuration. The machine does not halt from the all-0 configuration.

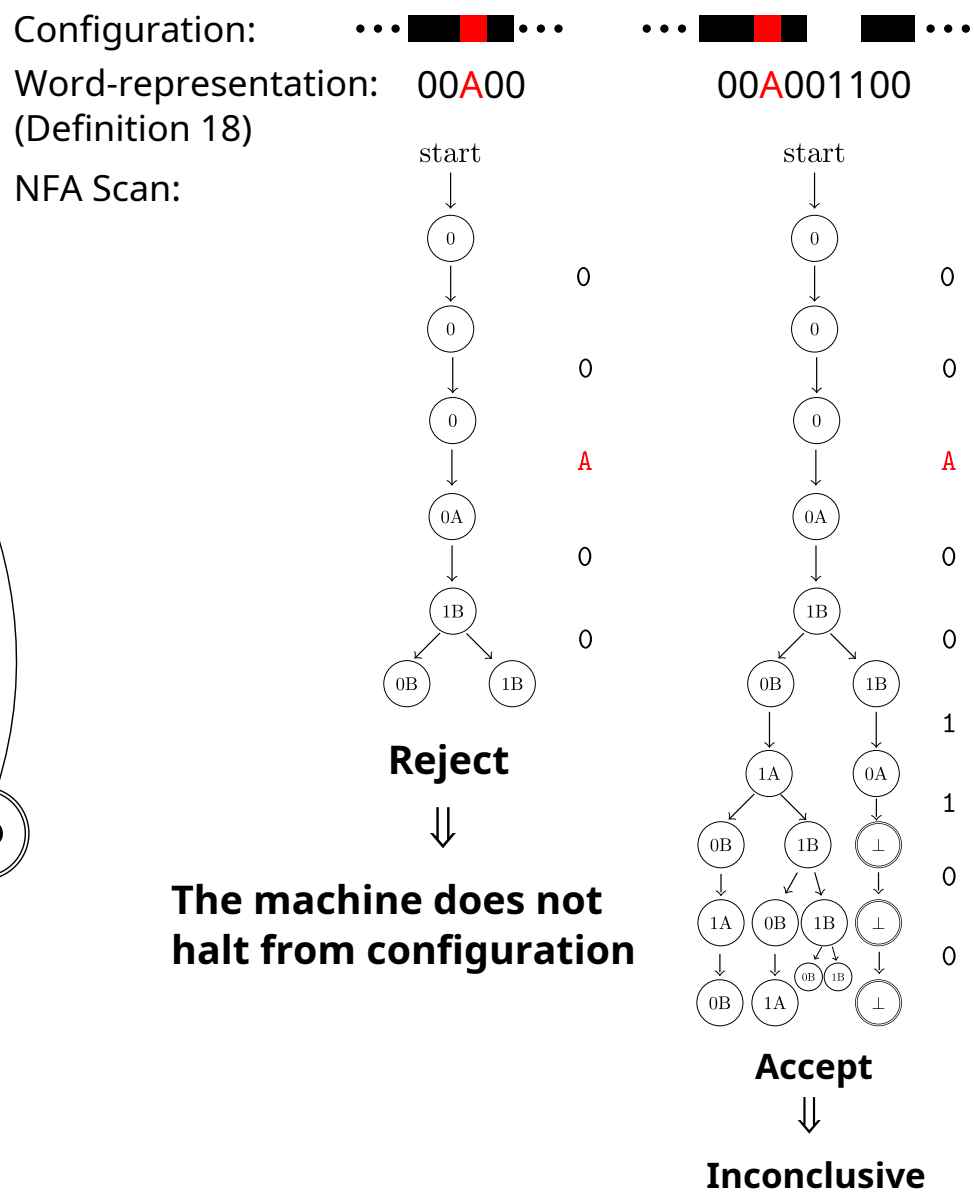
	0	1
A	1RB	0LD
B	1LC	1RA
C	0RB	0LC
D	- - -	1LA

(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.





(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 configur does not eventually halt, see Theorem 20. Right: The NFA rejects the all-0 configuration, the machine does not from it. The NFA accepts the starting (or any) configuration shown in (c) hence we cannot conclude that it is non-halting, which is consistent since it eventually halts.