State Diagram for the FSM representation
of an up−down Binary Coded Decimal Counter

up_down_bar = = 1'b1

up_down_bar = = 1'b0
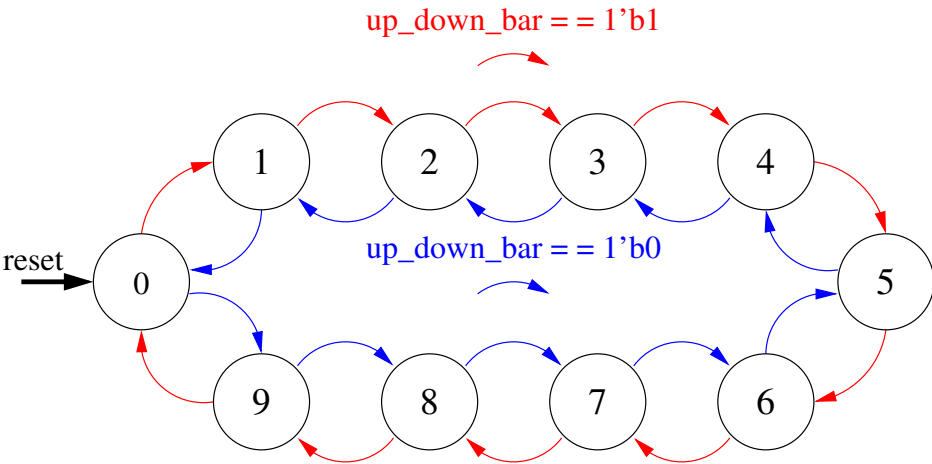
reset

Rules: 1: All states must be named and the names must be unique.

2: All arrows must be labelled with an expression
that evaluates to a boolean value, i.e. true or false.

3: The heads of all arrows must point to a state.

4: All arrows except "reset" must originate from a state,
i.e. the tails of all arrows must touch a state.

5: One, and only one, of the boolean expressions for the
arrows originating from a state, can, and must, be true
while that state is the current state of the FSM.

6: An arrow is said to be active when its boolean expression
is true and the state from which it originates is the current
state pf the FSM.

7: If "reset" is active, it supersedes any other active arrow.

8: Exactly one state must be active at a time, i.e. all but one
state must be inactive at all times.

9: The next active state is the state pointed to by the one and
only active arrow.