Artificial Intelligence

A (non-deterministic) finite-state machine is given by a triple
[ Trans, Final, q0 ]
consisting of
a list Trans of triples [ Qnow, Symbol, Qnext ] specifying transitions,
a list Final of final/accepting states, and
an initial state q0.

A (non-deterministic) Turing machine is given by a list
[ MoveRight, MoveLeft, WriteList, HaltList, q0]
consisting of
a list MoveRight of triples [ Qnow, Symbol, Qnext ] for moving right,
a list MoveLeft of triples [ Qnow, Symbol, Qnext ] for moving left,
a list WriteList of 4-tuples [ Qnow, SymIn, SymOut, Qnext ] for writing,
a list HaltList of pairs [ Qnow, Sym ] for halting, and
an initial state q0.

We will often leave out the initial state q0.

The language
epsilon + 01 + 0011 + 000111 + ... 

generated by the context free grammar

S -> epsilon | 0S1

is accepted by the Turing machine with

MoveRight = [ [moveRight,X,seekR#],
[seekR#,0,seekR#], [seekR#,1,seekR#],
[seekL#,#,q0] ]

MoveLeft = [ [seekR#,#,check1],
[moveLeft,X,seekL#],
[seekL#,0,seekL#], [seekL#,1,seekL#] ]

WriteList = [ [q0,0,#,moveRight],
[check1,1,#,moveLeft] ]

HaltList = [ [q0,#] ]