

A language no fsm accepts

$\{\epsilon, ab, aabb, aaabbb, \dots\}$

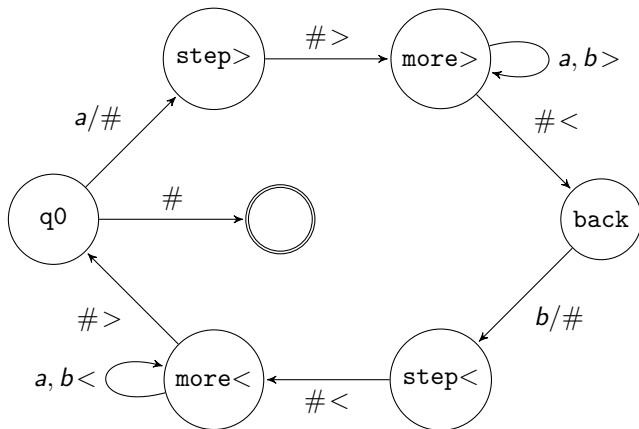
context-free grammar $S \rightarrow \epsilon \mid aSb$

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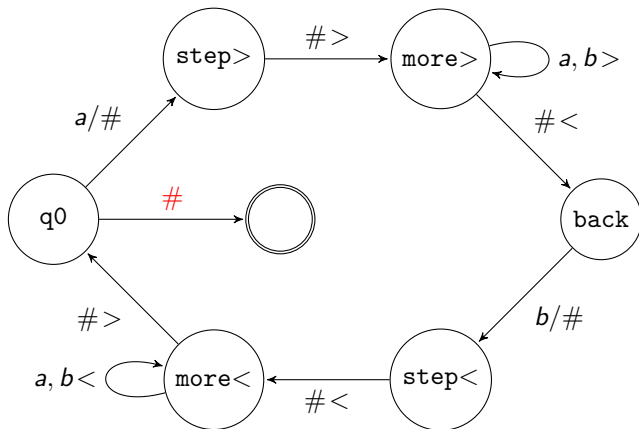


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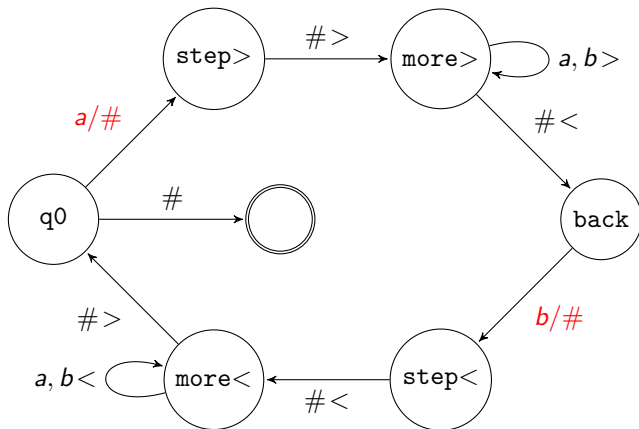


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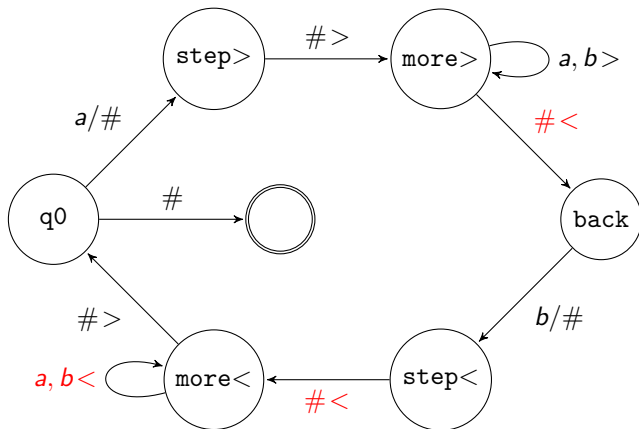


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$T_m = fsm + MLeft/Write/Halt$

A **Turing machine** $(T_m) M$ is a 5-tuple

$[MRight, MLeft, Write, Halt, Q_0]$

where

- $MRight$ is a list of triples $[Q, X, Q_n]$ such that at state Q and seeing symbol X , M may move right, and change state to Q_n
- Q_0 is M 's initial state

$T_m = fsm + M_{Left/Write/Halt}$

A **Turing machine** $(T_m) M$ is a 5-tuple

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where

- M_{Right} is a list of triples $[Q, X, Q_n]$ such that at state Q and seeing symbol X , M may move right, and change state to Q_n
- Q_0 is M 's initial state
- M_{Left} is a list of triples $[Q, X, Q_n]$ such that at Q and seeing X , M may move left, and change state to Q_n

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- M_{Left} is a list of triples $[Q, X, Q_n]$ such that at Q and seeing X , M may move left, and change state to Q_n
- $Write$ is a list of 4-tuples $[Q, X, Y, Q_n]$ such that at Q and X , M may write Y , and change state to Q_n without moving

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N.B. A fsm is a T_m where $M_{Left} = [] = Write$, and for every pair $[Q, X]$ in $Halt$, the symbol X is $\#$ (blank).