Theory-of-Languages-and-Machines

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Introduction to Automata Theory,Formal Languages and Computation
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Example 8.18

Construct a TM over $\{a, b\}$ which contains a substring abb.

Solution: In regular expression, it can be written as $(a, b)^* abb(a, b)^*$. In this expression, the substring is important. The string may be abb only. In that case, the machine gets 'a' as input in the beginning state. Before traversing the substring 'abb', there is a chance to traverse 'a' of $\{a, b\}^*$. The transitional functions are

Example 8.18

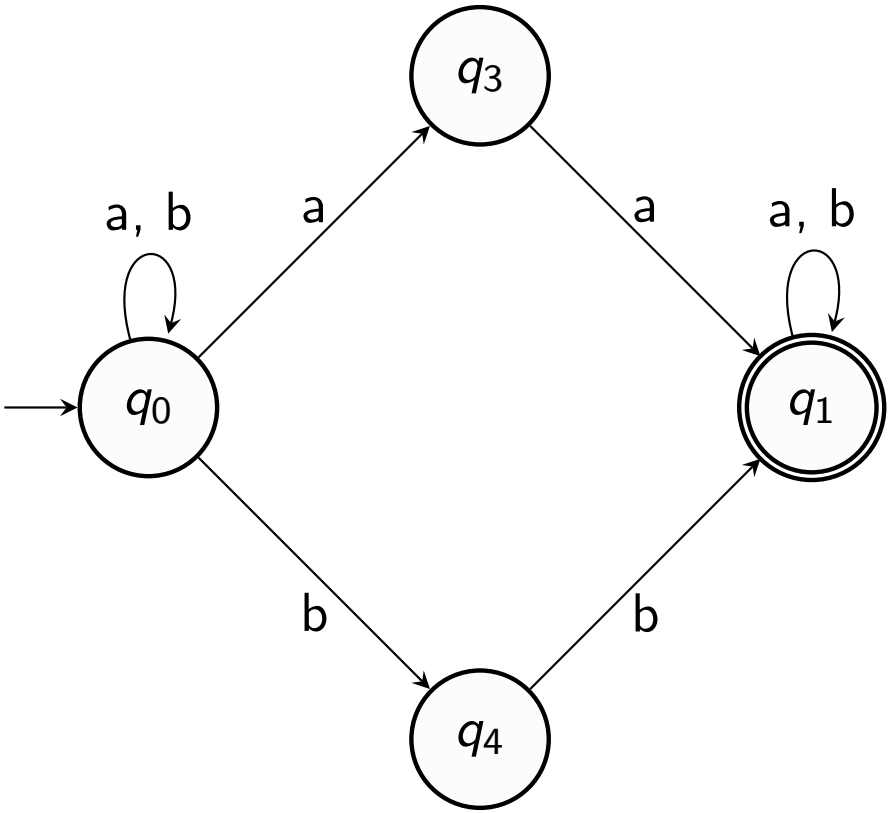
$$\sigma(q1, a) \rightarrow (q1, a, R), (q2, a, R)$$
$$\sigma(q1, b) \rightarrow (q1, b, R)$$
$$\sigma(q2, b) \rightarrow (q3, b, R)$$
$$\sigma(q3, b) \rightarrow (q4, b, R)$$
$$\sigma(q4, a) \rightarrow (q4, a, R)$$
$$\sigma(q4, b) \rightarrow (q4, b, R)$$
$$\sigma(q4, B) \rightarrow (qf, B, H)$$

In state q_1 for input 'a', there are two transitional functions. So, it is a non-deterministic TM.

Example 8.19

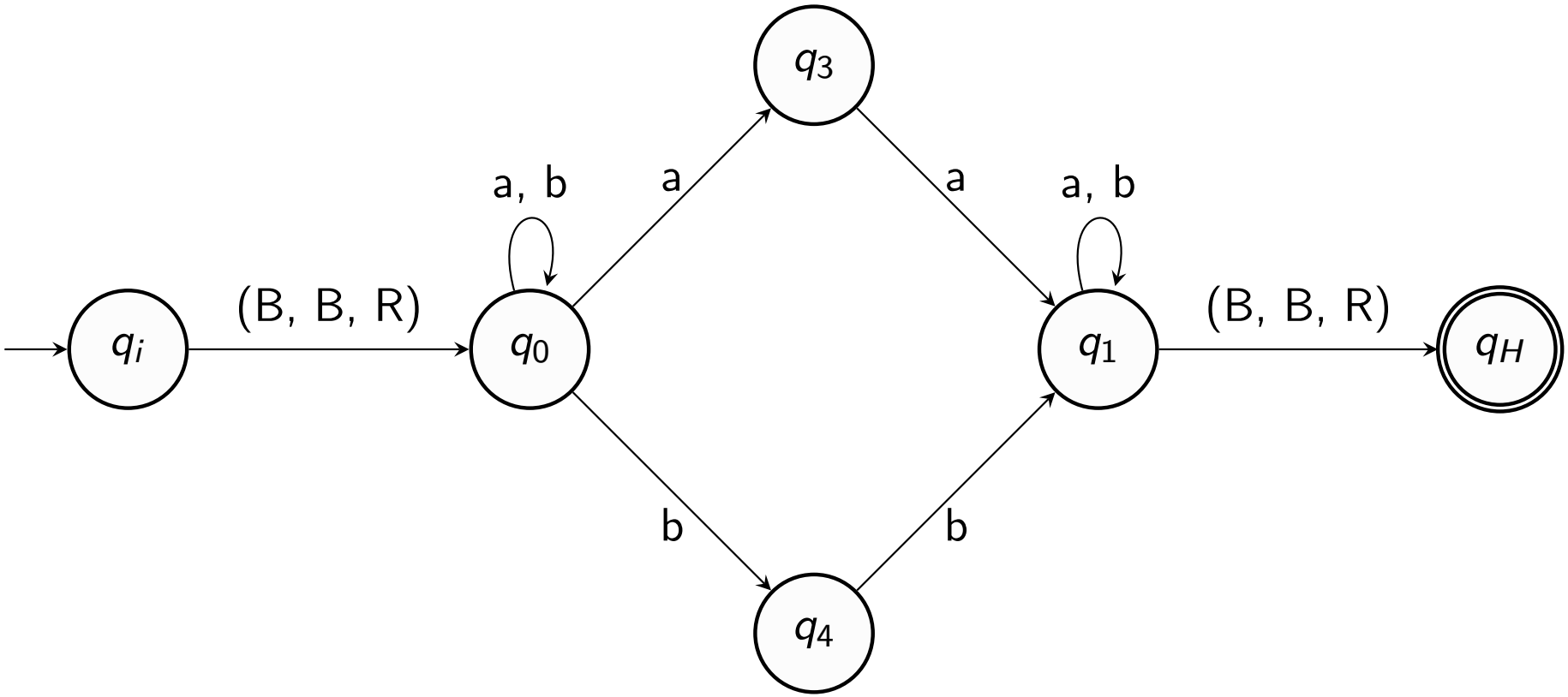
Construct a TM for the regular expression $(a+b)^*(aa+bb)(a+b)^*$.

Solution: The finite automata accepting the regular expression is



Example 8.19

Continue the solution:Inserting a new initial state q_i and final state q_H, the finite automata becomes



Example 8.19

Continue the solution: Converting the levels of the inputs, the TM becomes