Theory of Automata – Home Work 8

Name – Akshay Kumar Singh

R11603620

1. Let M = (K, Σ, δ, s, {h}), where

K = {q0, q1, h},

Σ = {a, b, ❑, },

s = q0, and δ is given by the following table,

|  |  |  |
| --- | --- | --- |
| q | σ | δ(q, σ) |
| q0 | a | (q1, b) |
| q0 | b | (q1, a) |
| q0 | ❑ | (h, ❑) |
| q0 |  | (q0, →) |
| q1 | a | (q0, →) |
| q1 | b | (q0, →) |
| q1 | ❑ | (q0, →) |
| q1 |  | (q1, →) |

(a) Trace the computation of M starting from the configuration (q0, aabbba).

(b) Describe informally what M does when started in q0 on any square of a tape.

Sol : (a)

|  |  |
| --- | --- |
|  | q0, aabbba  q1, babbba  q0, babbba  q1, bbbbba  q0, bbbbba  q1, bbabba  q0, bbabba  q1, bbaaba  q0, bbaaba  q1, bbaaaa  q0, bbaaaa  q1, bbaaab  q0, bbaaab❑  h, bbaaab❑ |

(b) Converts all a's to b's, & vice versa, starting from the current symbol and moving towards right

1. M = (K, Σ, δ, s, {h}), where

K = {q0, q1, q2, h},

Σ = {a, b, ❑, },

s = q0,

and δ is given by the following table (the transitions on are δ(q, ) = (q, ), and are omitted).

|  |  |  |
| --- | --- | --- |
| q | σ | δ(q,σ) |
| q0 | a | (q1, ←) |
| q0 | b | (q0, →) |
| q0 | ❑ | (q0, →) |
| q1 | a | (q1, ←) |
| q1 | b | (q2, →) |
| q1 | ❑ | (q1, ←) |
| q2 | a | (q2, →) |
| q2 | b | (q2, →) |
| q2 | ❑ | (h, ❑) |

Start from the configuration (q0, abb❑bb❑❑❑aba).

Sol :

|  |  |
| --- | --- |
| A picture containing text, whiteboard  Description automatically generated | q0, abb❑bb❑❑❑aba  q0, abb❑bb❑❑❑aba  q0, abb❑bb❑❑❑aba …  q0, abb❑bb❑❑❑aba  q1, abb❑bb❑❑❑aba …  q1, abb❑bb❑❑❑aba  q2, abb❑bb❑❑❑aba  h, abb❑bb❑❑❑aba |