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|  | NATIONAL UNIVERSITY  OF COMPUTER & EMERGING SCIENCES  PESHAWAR CAMPUS |  |

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**Problem Set :** Implement 01 **Semester:** FALL 2021

**Date Set :** Monday December 20, 2021 **Due Date :** Friday Dec.24, 2021

**Course :** CS301 Theory of Automata **Instructor:** Shakir

**Language**

{a^n b^m c^k|n>=1,m=n+1,k=m+1}

Descriptive Definition:

Any number of a’s followed by number of b’s and then followed by number of c’s where number of a’s is less than number of b’s which is less less than number of c's

**Words:**

{abbccc,aabbbcccc,aaabbbbccccc,aaaabbbbbcccccc,aaaaabbbbbbccccccc,aaaaaabbbbbbbcccccccc,aaaaaaabbbbbbbbccccccccc,aaaaaaaabbbbbbbbbcccccccccc, aaaaaaaaabbbbbbbbbbccccccccccc,aaaaaaaaaabbbbbbbbbbbcccccccccccc,…..}

**Machine Diagram**

Diagram

Description automatically generated

**Source Code**

string = input("Enter word: ")

length = len(string) + 2

tape = ['\*']\*length

i = 1

tapehead = 1

#loop to place characters of word in machine's tape

for s in string:

tape[i] = s

i += 1

state = 0

X, Y, Z, S, B, R, L = 'X', 'Y', 'Z', 'S', '\*', 'R', 'L'

oldtapehead = -1

accept = False

def action(input\_char, replace\_with, move, new\_state):

global tapehead, state

if tape[tapehead] == input\_char:

tape[tapehead] = replace\_with

state = new\_state

if move == 'L':

tapehead -= 1

return True

elif move == 'R':

tapehead += 1

return True

return False

#if tapehead is static then terminate Turing machine

while(oldtapehead != tapehead):

oldtapehead = tapehead

print(tape , "with tapehead at index", tapehead, "on state" , state)

if state == 0:

if action('a', X, R, 1) or action(Y, Y, R, 4) or action(X, X, R, 1):

pass

elif state == 1:

if action('b', Y, R, 2) or action(X, X, R, 1) or action(Y, Y, R, 1) or action('a', 'a', R, 1):

pass

elif state == 2:

if action('c', Z, L, 3) or action('b', 'b', R, 2) or action(Z, Z, R, 2):

pass

elif state == 3:

if action('a', 'a', L, 3) or action('b', 'b', L, 3) or action(Y, Y, L, 3) or action(Z, Z, L, 3) or action(X, X, R, 0):

pass

elif state == 4:

if action(X, X, R, 4) or action(Z, Z, R, 5) or action(Y, Y, R, 4) or action('b', Y, R, 2):

pass

elif state == 5:

if action('c', Z, L, 3) or action(Z, Z, R, 5) or action(B, B, R, 6):

pass

elif state == 6:

accept = True

else:

accept = True

print("\nAfter Computation of Turing Machine we conclude that \n")

if accept:

print("Word is accepted on state = ", state)

else:

print("Word is not accepted on state = ", state)