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Turing machine is computational model that can simulate any complicated computer algorithm. Turing machine consists of an infinitely long tape which like a memory in the computer.

This square of the tape usually blanks, and we can write symbols inside it. The machine has three major operations.

1. Read the symbol from it
2. Write symbol or editing symbol already exists
3. Move right, left or stay at specific position.

We can represent the Turing machine or its transition table by state diagram:

* The nodes represent each state.
* The arcs labelled with the input of the language that in the tape, read the symbol then editing it or write new one then moving inside the tape.
* The initial sate with input arc that the machine starts from it.
* The final state or the accept state that indicated with two circles.

The string will be accepted only if end of input and the machine at the accept state and any other conditions the machine halting. We suppose to design machine that accepts this 𝐴={0^2^𝑛|𝑛≥0}.

The state diagram for this machine as follow:

x x,L

0 0,L Q2 E E, L

x x, R E E, R x x, R

Q0 0 E, R Q1 0 x, R Q3

E E,R 0 x, R 0 0, R

reject accept Q4

x x, R

E E, R

This state diagram implemented in java code. There is a class called Nodes that has linked list each node of the linked list represents one state. Each node of the linked list labeled with string name to define this node.

public class Nodes {

private String currentState;

public String getCurrentState() {

return currentState;

}

public void setCurrentState(String currentState) {

this.currentState = currentState;

}

public void validation(String state)

{

if("acceptState".equals(state))

System.out.println("the string is accepted");

else

System.out.println("the string is rejected");

}

public void linkedNodes() {

state = new LinkedList();

state.add("startState");

state.add("q1");

state.add("q2");

state.add("q3");

state.add("q4");

state.add("acceptState");

state.add("rejectState");

We can represent this state diagram by this transition and each transition consists of

Read from write into move to

tape tape next position in the tape

0 £ , 0

And this the transition table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| current state | read | write | move | next state |
| q0 | 0  x  E | Empty  x  E | R  R  R | Q1  reject  reject |
| q1 | 0  x  E | x  x  E | R  R  R | Q3  Q1  accept |
| q2 | x  0  E | x  0  E | L  L  R | Q2  Q2  Q1 |
| q3 | 0  x  E | 0  x  E | R  R  L | Q4  Q3  Q2 |
| Q4 | 0  x  E | x  x  E | R  R  R | Q3  Q4  reject |