



3 Head Turing Machine Laboratory

Sebastián Barrera¹

¹Software engineering, Faculty of engineering, Icesi University.

Summary

A Turing machine is a device that manipulates symbols on a strip of tape according to a rule table. Despite its simplicity, a Turing machine can be adapted to simulate the logic of any computer algorithm and is particularly useful in explaining the functions of a computer's central processing unit.^{2,3}

Computer scientist S rdna Lab zitsira has just proposed a resizable but not limited-sized finite Turing machine with three heads. It is very important for the continuation of your research to prove its operation and for this reason has asked you to give a series of instructions, you have simulated the machine and run each one.

1. Functionals Requirements

Req1. Use three heads to point to the first element, middle element and the last element to the tape in every moment.

Req2. Read instructions that consist at least in two letters, the first one indicates what head is going to do the action, the second one indicates what will be the action to do; read-write, add and remove an element from the tape. In case that the action is add, the instruction will have another character because it will be the new element.

Req3. Read-Write the element over the indicate head is pointing. In case that the tape has no elements, it will read-write #.

Req4. Add a new element. If the first head is adding, the new element will be the first element, else if the second head is adding, the new element will be at the middle of the list, and then else if the third element is adding, the new element will be the last element of the tape. Regardless of the case, the heads will correctly point to the first, the middle and the last element. In case that the tape have no elements, nothing will be happen.

² https://es.wikipedia.org/wiki/M%C3%A1quina_de_Turing

³ https://docs.google.com/document/d/1IY8VD7cQFpFqSQAC70_PB20uK2ikVH97QcY00agqYg/edit#

Req5. Remove the element over the indicate head is pointing. If the first head is removing, the first head will point to the next one of the removed, else if the second head is removing, depends of the number of elements of the list, if the size is even, the second head will point to the next element, else, will point to the previous element, and then else if the last head is removing, the last head will point to the previous of the removed.

Req6. Take the time it takes for your program in milliseconds, from the start of the program, before any other instruction, until all other instructions have been executed.

2. Non-Functionals Requirements

Non-Req1. Work only with file text in input and output.

Non-Req2. Use BufferedReader to read the input file.

Non-Req3. Use BufferedWriter to over write the output file.

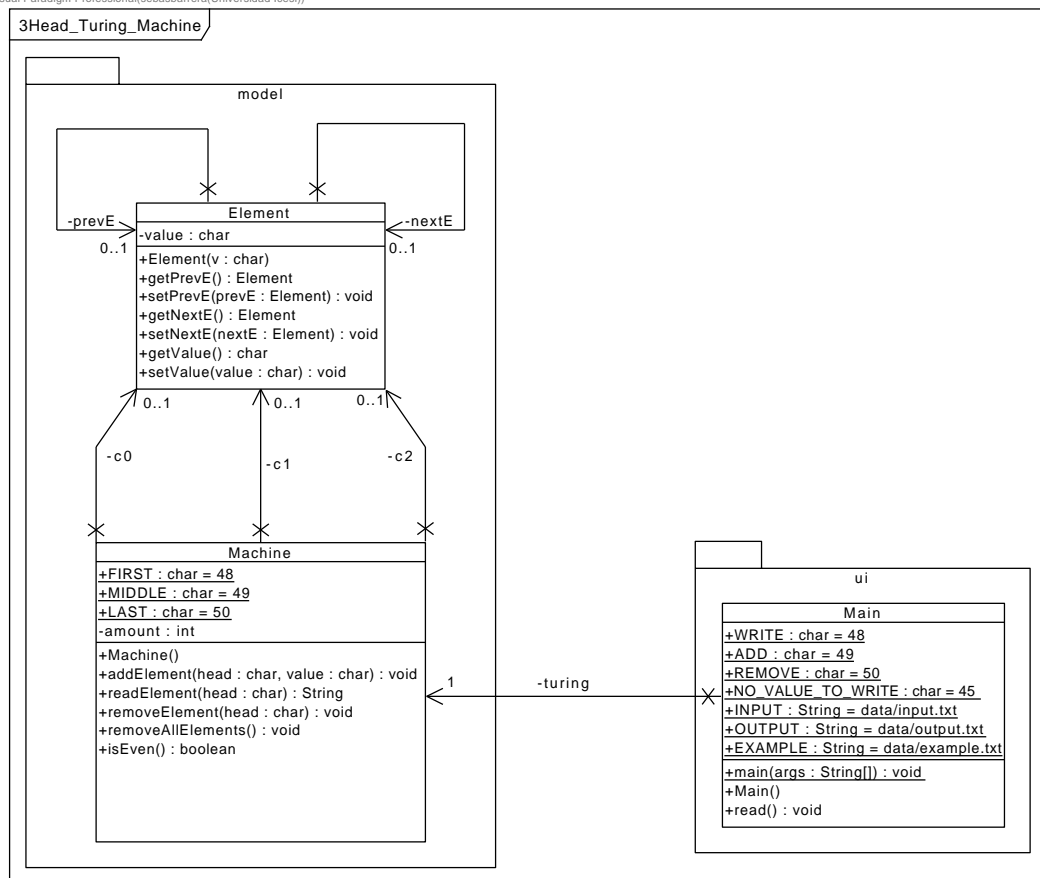
Non-Req4. Print the time it takes for your program to run. It must be the only value printed on console.

Non-Req5. Make sure that the maximum time for any input should not exceed 1 second.

Non-Req1. Work the Turing machine with any type of linked list.

3. Class Diagram

Visual Paradigm Professional(sebasbarrera(Universidad Icesi))



2 https://es.wikipedia.org/wiki/M%C3%A1quina_de_Turing

3 https://docs.google.com/document/d/1IY8VD7cQFpFqaSQAC70_PB20uK2ikVH97QcY00agqYg/edit#