

INFO 300
Intellectual Foundations of Informatics

Using the Turing Machine Simulator

The Turing Machine Programs

At the end of this document are the Turing Machine programs ('All 0s' and the Mystery Machines) that you will need to complete this lab. You may cut and paste from this document into the online Turing Machine. (Use the text selection tool for Adobe PDFs: )

Opening the TM simulator on the Web

Point your Internet browser at <http://www.igs.net/~tril/tm/tm.html>.

Programming the TM simulator

You can program the TM simulator by (a) cutting and pasting an existing program from this document or (b) by typing in your own program.

To cut and paste an existing program into the simulator:

- a. Copy the rules for the TM from below. Note: Copy only the rules for the program, not the comment statements that begin with a “#” symbol.
- b. Click within the “Programming” text-box (in the lower left hand corner of the simulator).
- c. Paste your rules into the text-box.

To type in your own program into the simulator:

- a. Type in the rules of your program into the “Programming” text-box, one rule at a time. Each rule should use the following format:
Current State, Current Symbol, Next State, Next Symbol, Director (e.g., < or >)
(For example, a rule stating that when the TM is in state 1 and is reading a 1 it should switch to state 3, write a 0, and move left is written as: 1,1,3,0,<)
- b. Other details:
 - i. Each rule should be ended with a carriage return (e.g., “ENTER” key).
 - ii. This simulator assumes a start state of 1.
 - iii. A blank or empty cell can be represented by an underscore (_).
 - iv. Left and right are represented by “<” and “>” respectively.

Once you have entered a program into the “Programming” text-box, you must click “Install Program” to enter the program. Check the message box below the “Install Program” button for error messages. Note: You must click “Install Program” whenever you make changes to the rules.

Entering the input

Type the input you wish to appear on the tape into the text-field labeled “Initial characters on tape”.

Details:

- i. Use an underscore (_) to represent blank cells.
- ii. You may change the input to test the same set of rules on different inputs.

Running the simulation

Click “Start”. The characters from the “Initial characters on tape” text-field will appear on the tape and the TM will begin to run.

You may choose the speed at which you wish the simulation to run. The “Slow” speed is good when you want to observe the execution of the rules. “Compute” will show only the final output on the tape, not the activity of the TM. You can also run the program using “Step” to watch the machine follow one rule at a time. The button “Stop” and “Resume” stop and continue the execution of the Turing machine, respectively. Note that the current state of the TM is displayed at the top of the simulation.

The Turing Machine Programs for Lab 4

#LAB 3 -Turing Machines - Symbol Manipulation

#Sample Machines for use with Lab 3

TM1: Change Everything to 0's

Input Alphabet: 1 0 _

Input Format: Any number of 1s and 0s followed by a _.

1,0,1,0,>

1,1,1,0,>

1,_,H,_,>

Mystery TM1: ????

Input Alphabet: A a _

Input format: Any number of A's and a's, ending with a _.

1,_,H,F,>

1,A,2,A,>

2,A,2,A,>

2,a,2,a,>

2,_,H,T,>

1,a,3,a,>

3,A,3,A,>

3,a,3,a,>

3,_,H,F,>

Mystery TM2: ???

Input Alphabet: 1 0 _

Input Format: Any number of 1's and 0's followed by a _.

1,0,3,_,>

3,1,3,1,>

3,0,3,0,>

3,_,4,0,<

1,1,2,_,>

2,0,2,0,>

2,1,2,1,>

2,_,4,1,<

4,0,6,_,<

6,0,6,0,<

6,1,6,1,<

6,_,1,0,>

4,1,5,_,<

5,1,5,1,<

5,0,5,0,<

5,_,1,1,>

4,_,7,_,>

1,_,7,_,>

7,1,9,_,<

7,0,8,_,<

9,_,4,1,>

8,_,4,0,>

7,_,H,_,<

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# Mystery TM3: ????  
# Input Alphabet: A B _  
# Input format: Any number of As and Bs, beginning  
#               with a _ and ending with a _  
1,_,2,#,>  
2,A,3,_,>  
2,B,4,_,>  
2,_,7,_,<  
3,A,3,A,>  
3,B,3,B,>  
3,_,5,_,<  
4,A,4,A,>  
4,B,4,B,>  
4,_,6,_,<  
5,A,11,_,<  
5,B,12,_,<  
5,_,7,_,<  
6,A,12,_,<  
6,B,11,_,<  
6,_,7,_,<  
7,_,7,_,<  
7,#,8,_,>  
8,_,9,Y,>  
9,_,10,E,>  
10,_,H,S,>  
11,A,11,A,<  
11,B,11,B,<  
11,_,2,_,>  
12,A,12,_,<  
12,B,12,_,<  
12,_,12,_,<  
12,#,13,_,>  
13,_,14,N,>  
14,_,H,O,>
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