CS361, Fall 1995

Instructor: Guo-Qiang Zhang

Lecture Notes of 09/27/95

Topic: Turings world

Scribed by Srilekha S. Mudumbai and Vijaya L. Natarajan

1 Introduction

Turing machines, as they have come to be called, each has a finite number of possible states. It consists of a long, thin square tape from which it reads the input, and on which it writes the output too and moves left or right over the tape depending on the input symbols it reads.

2 Description of Turing Machines

The Turing machine is pictured over a tape on which some A's and B's (Input symbols) are written; its read/write head is poised above a B. Inside the machine we "see" two "states," the dark one being the state the machine is in, the light one the state it is going into. The label on the arc between them indicates that when the machine is in the state on the left and sees a B, it should move one square to the left.

2.1 Running a Turing Machine

Now, go to the **Execute** menu. The first five items on this menu runs the machine at various speeds.

Graphic: The action of the machine is displayed graphically on the screen while traversing the input symbols.

Fast: The computation is very fast and hence the computation cannot be followed in detail.

Lightning: In this mode, the computer carries out the computation in secret, as fast as possible, and then displays the result on the screen.

Step: This allows you to step through a computation one move at a time, taking as much time between steps as you want.

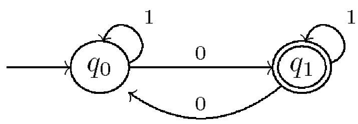
Reverse: This allows you to back up a computation, one step at a time.

3 Opening a machine from a file

To open a new machine from a file, pull down the **File** menu and choose **Open State Diagram** If you have an existing state diagram, choose this option ,else choose the **New State Diagram** option.

4 Stepping through a DFA

4.1 Example



The above **DFA** accepts the language consisting of strings with odd number of zero's. To draw this DFA, follow the steps given below:

1. Pull down the **Machine** menu and choose the **DFA** option.
2. Then pull down the **Alphabets** menu and choose the input symbols for the language for which the **DFA** is going to be constructed.
3. To draw a state, pick up the state icon from the menu of symbols and move the cursor and click it somewhere on the screen.
4. To draw the transition curve between states, pick the third icon from the **Tool Palette** and click the cursor on the source state and drag the cursor to the destination state and click.

5. For comments regarding the description of the internal states of the machine, use the 5th icon from the **Tool Palette** .
6. For refreshing the screen, select the 6th icon from the **Tool Palette**.
7. Select the 7th icon from the palette to clear the screen.
8. To cut a particular part of the state diagram, choose the 8th icon from the **Tool Palette**

4.2 Sample Run

Let's put the string

001010100101010

on the tape and run it with the above DFA.

5 Resetting the Machine

If you want to do something else without carrying out the computation to the end, you must choose the **Reset Machine** from the **Execute** menu. This will stop the computation and put the Turing machine back into its starting state.

6 Clearing the tape

To clear the tape, choose **Clear Tape** from the **Execute** menu. This replaces all the symbols on the tape with blanks.

7 Saving the State Diagram

To save the state diagram, choose **Save State Diagram** from the **File** menu.