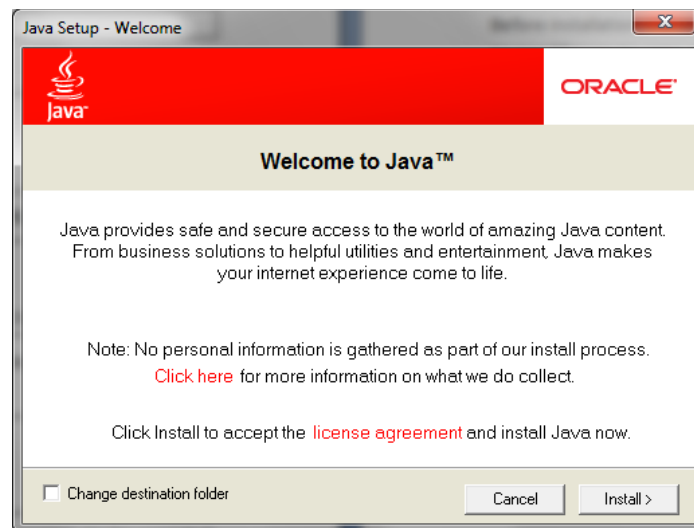


Turing Machine Simulator – User Manual

Installation

This software is a Java application and so the *Java Runtime Environment (JRE)* is required to use it on any computer. To install the *JRE*:

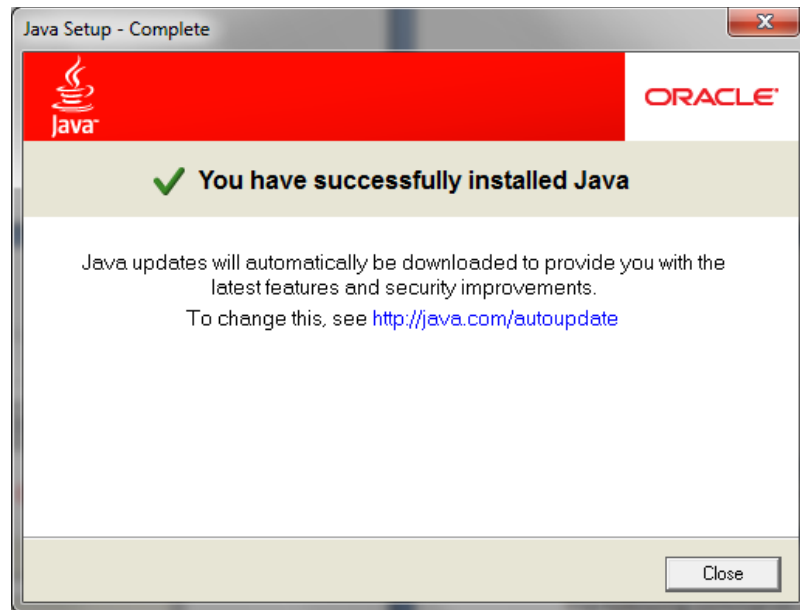
1. Go to <http://www.java.com/en/download/index.jsp> in your browser of choice.
2. Select “Free Java Download”.
3. After reading the license agreement, select “Agree and Start Free Download”.
4. If a dialog box appears asking you to Run or Save the file, select Run.
5. The following installation dialog will appear:



6. Select “Install”.
7. The following dialog will appear:



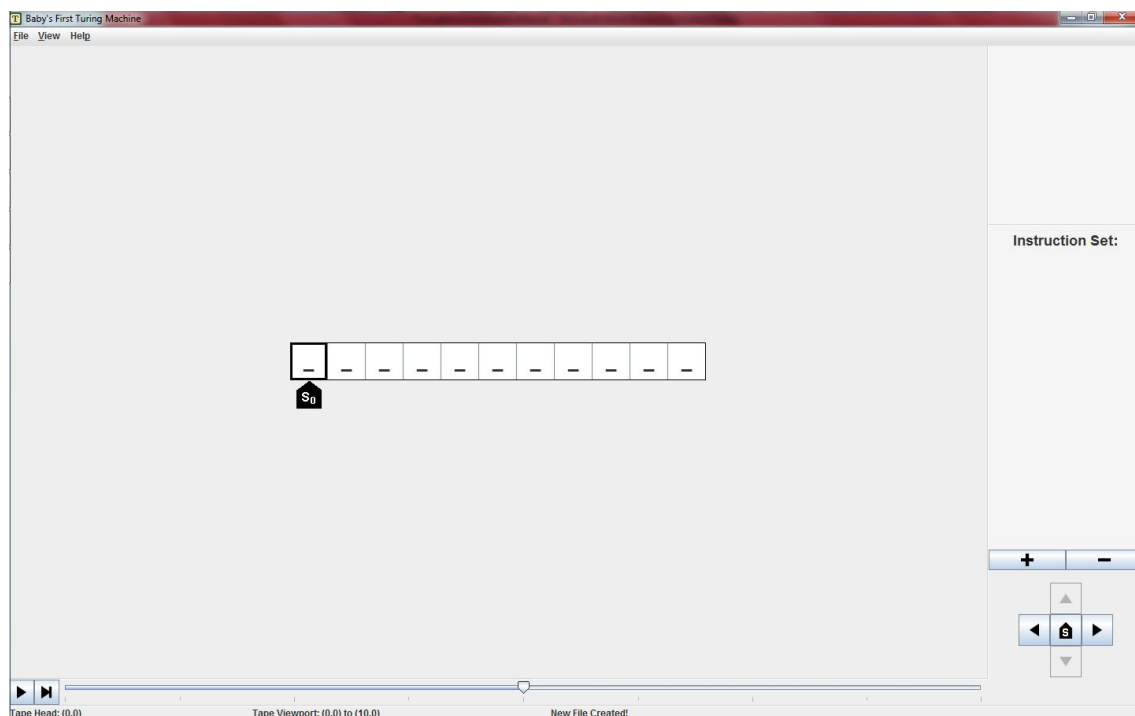
8. Wait for the *Java Runtime Environment* installation to finish.
9. When the installation has finished, you will see this dialog:



10. Congratulations! You have successfully installed the Java Runtime Environment.

Running the Program

To open your Turing Simulator now that you have installed the Java Runtime Environment, all you need to do is double click the `turingsimulator.jar` file contained within the folder. You should be greeted by something that, when full screen, looks similar to this -



Capabilities and Functioning

As our Turing Machine simulator can do a multitude of different things, I shall address each individually to explain them more in depth.

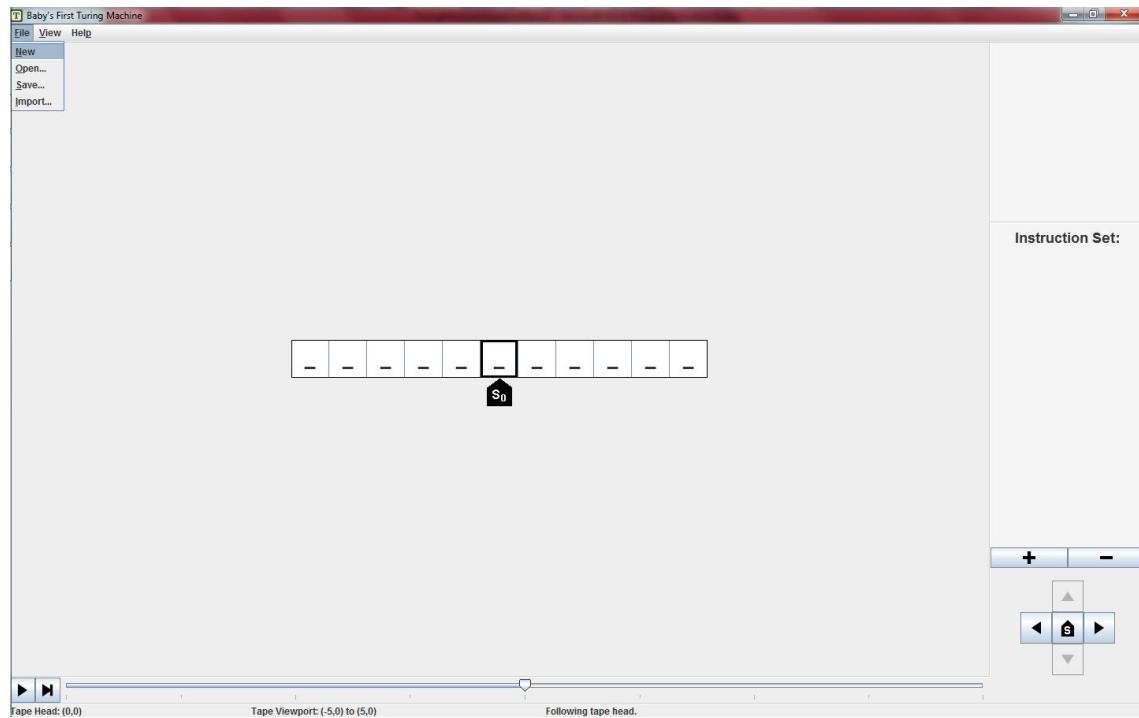
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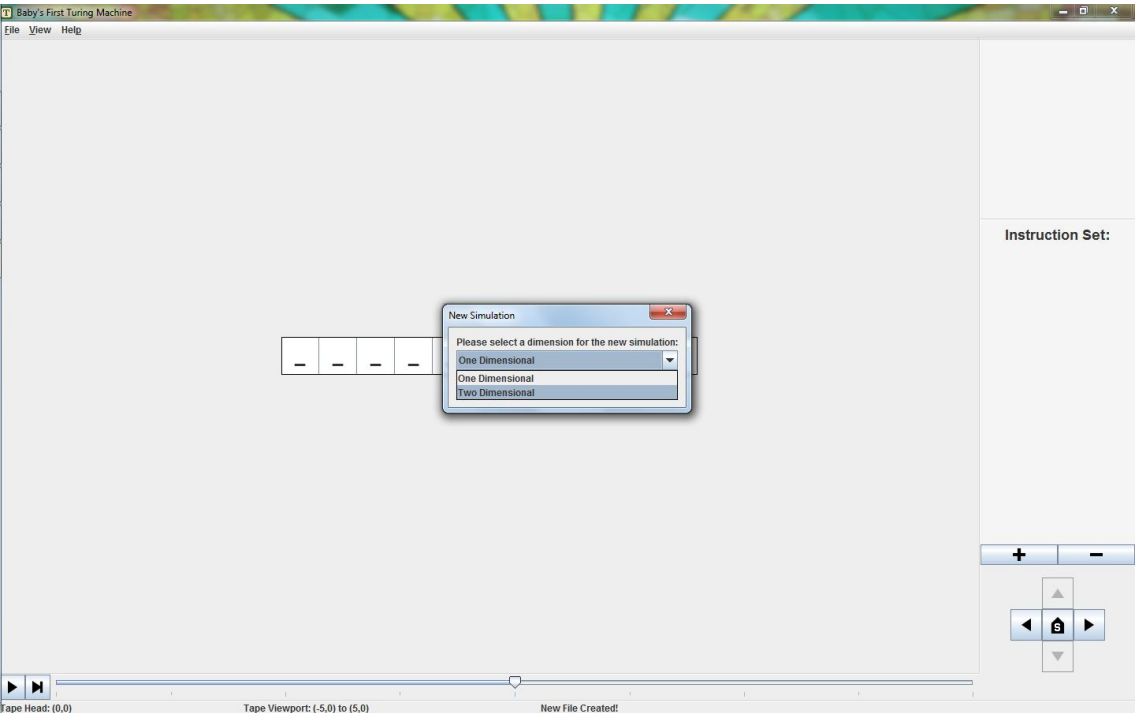
Creating a New File

How to create a new file for you to manipulate within this Turing Machine Simulator.

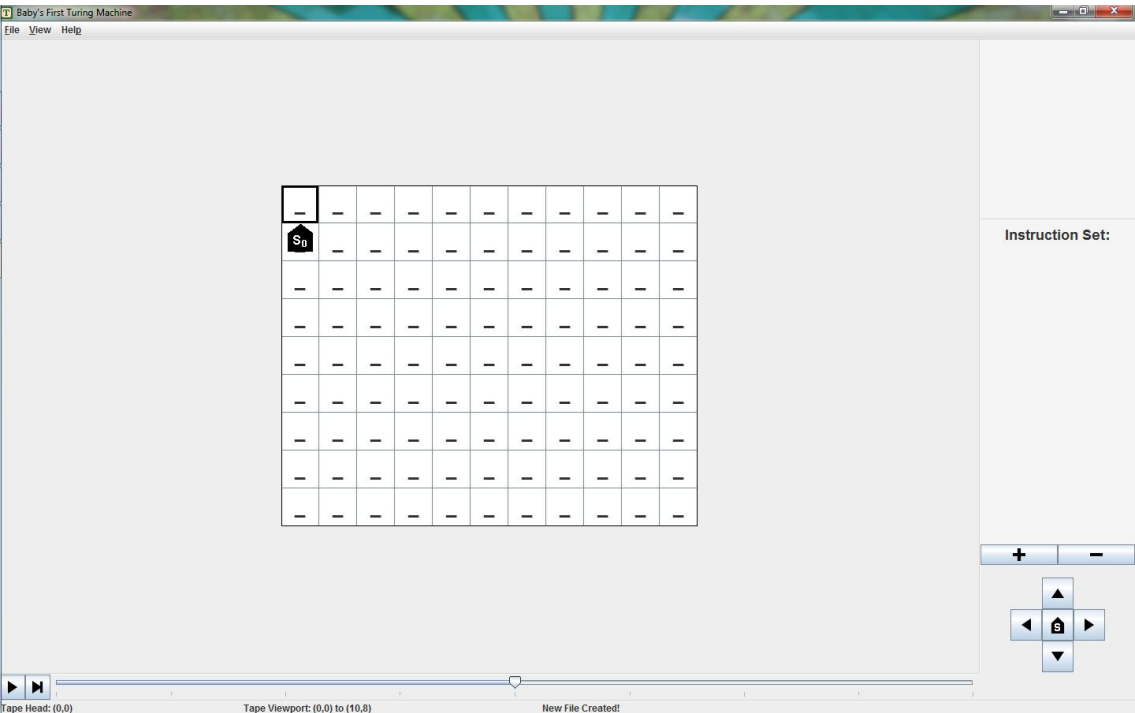
Firstly, you start by going to File > New, which is found in the top left corner, as illustrated in the screenshot below.



Here, you choose if you want to have a one dimensional, or two dimensional tape, as our simulator supports both formats. After doing so, click “OK”. Here, for the purposes of demonstration, I chose a two dimensional tape.



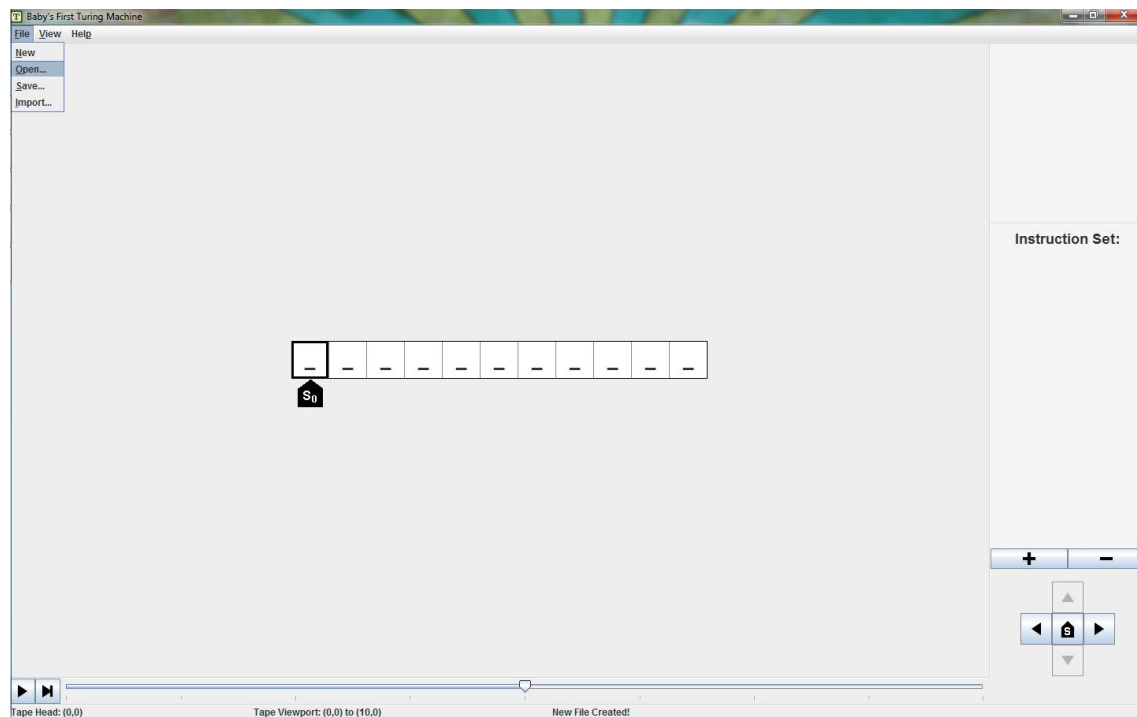
Your new, unaltered tape will appear, ready for you to put something on it!



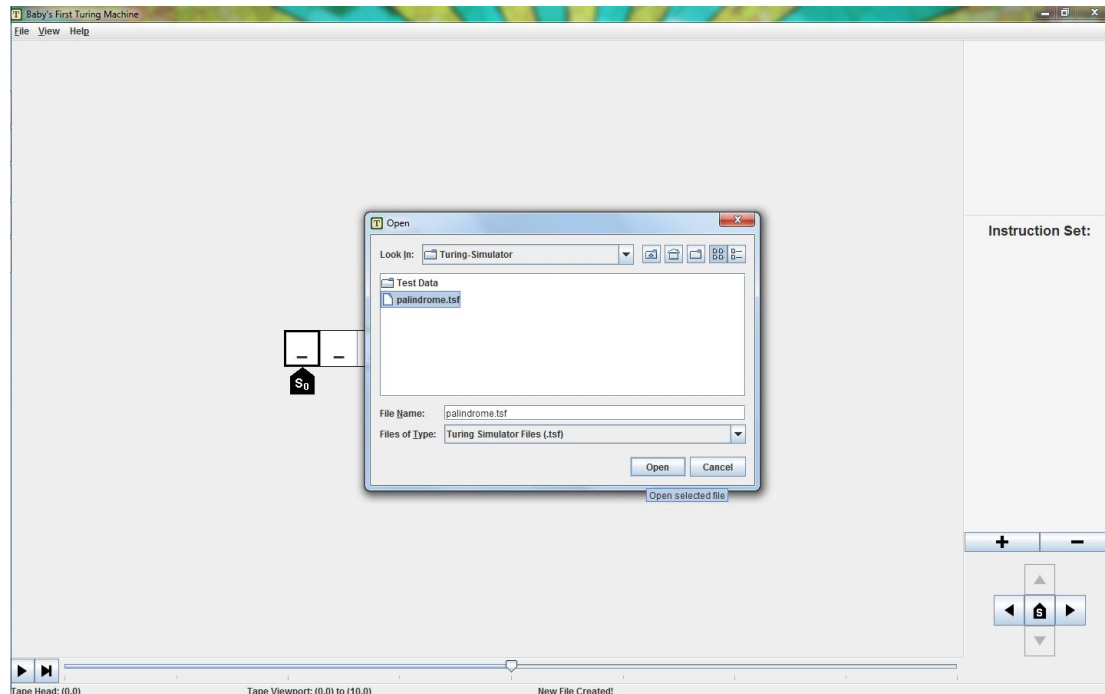
Opening Files

Here is how you open an existing file you have been working on earlier in the Turing Machine Simulator saved as a .tsf file. If you want to import a file such as a .txt file with correct Turing Machine formatting, skip to the [Importing Files section](#).

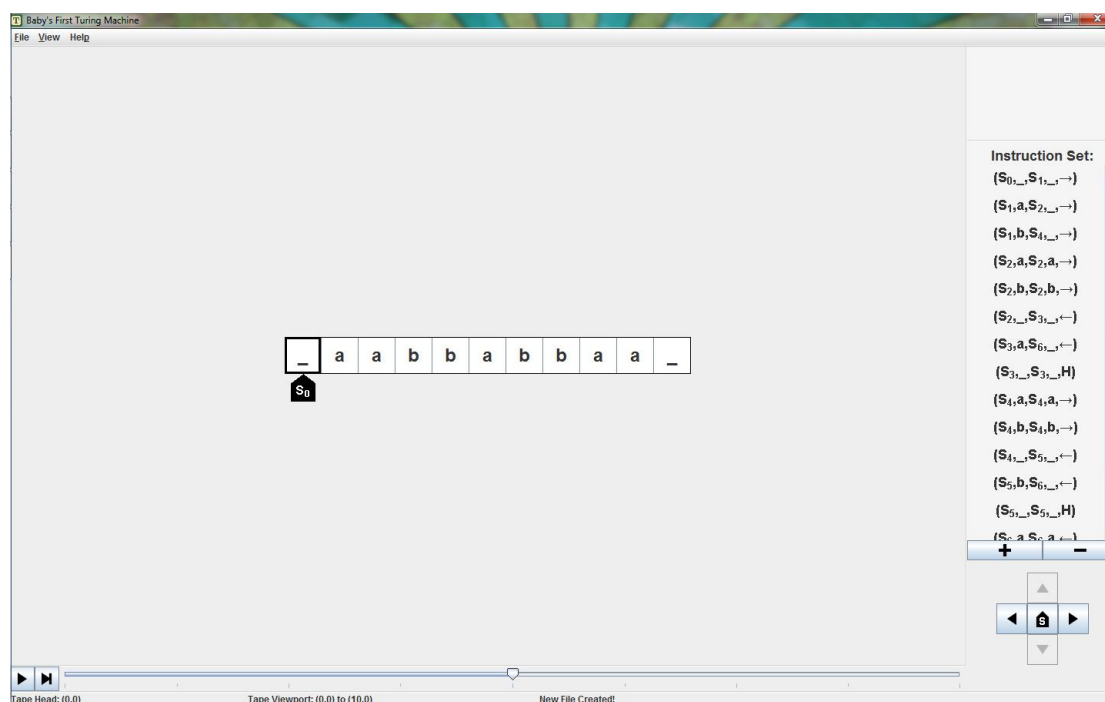
Firstly, direct yourself towards File>Open. Click it from any situation. It is located in the position illustrated below.



Next, navigate to where ever your .tsf file is located, then either double click on it, or click once and click “Open”. For this example, I have used a .tsf version of the “palindrome” test data provided by the Heriot-Watt brief.



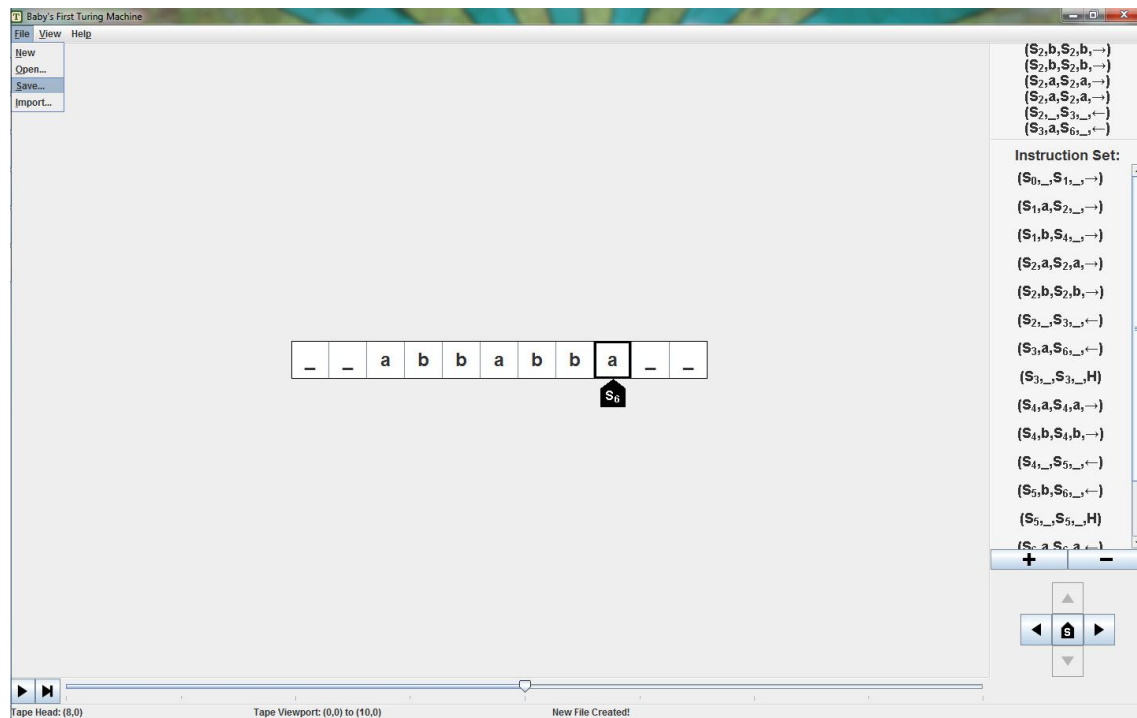
As you can see, the file will open, ready to be used, in the correct format (one dimensional, in this case) with a list of the Instructions along the right hand side and the actual tape in front of you.



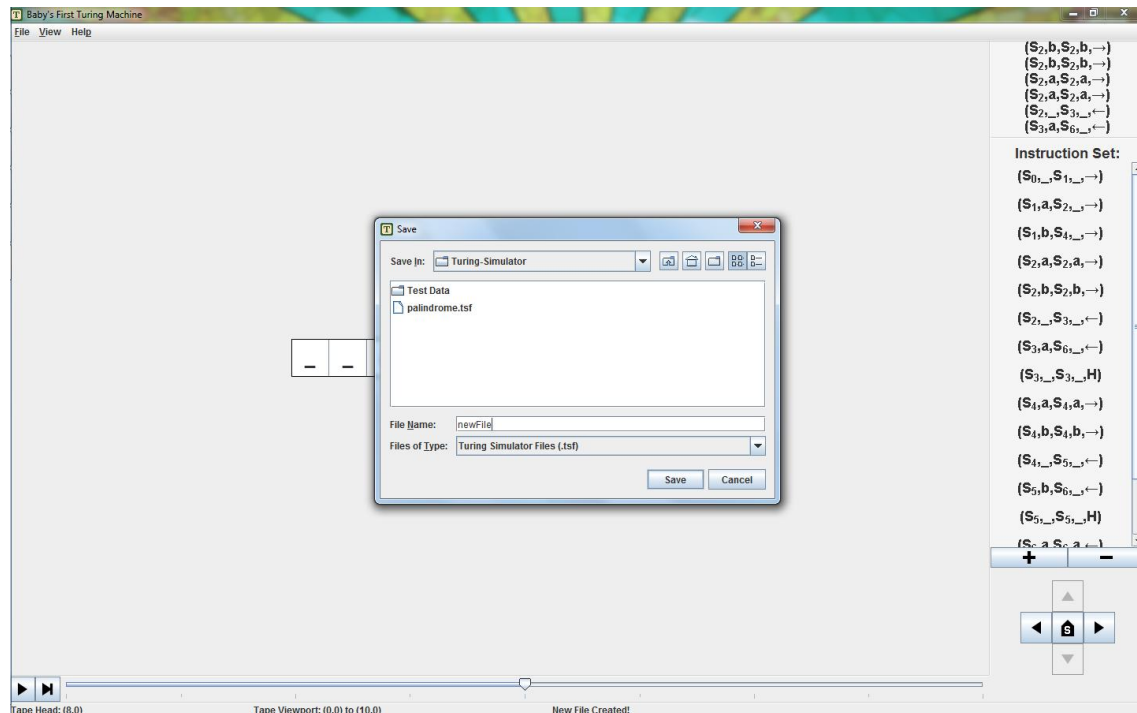
Saving Files

How to save the files you have created or altered using the Turing Machine Simulator.

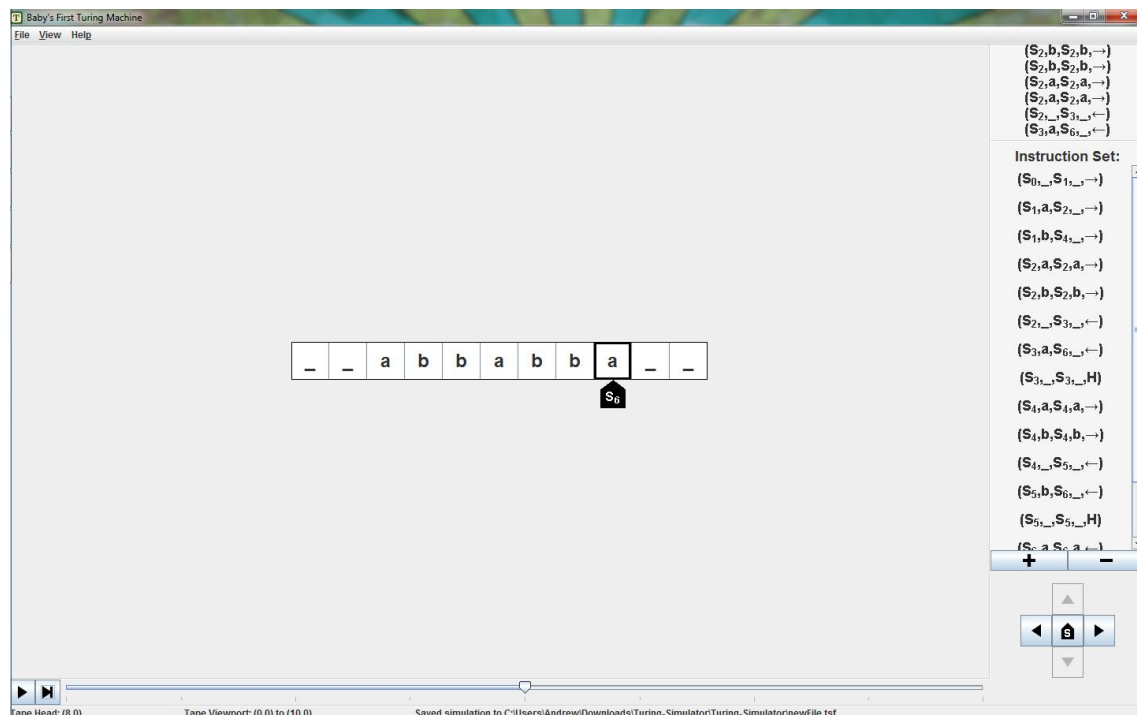
Once you have made some changes to a tape or are satisfied with the state of one you made yourself, you can save it for access at a later date. Simply navigate to File > Save as seen in the screenshot below, and you can open it later for easy access.



You then simply navigate to where ever you want to save the file, type in desired name, and hit “Save”.



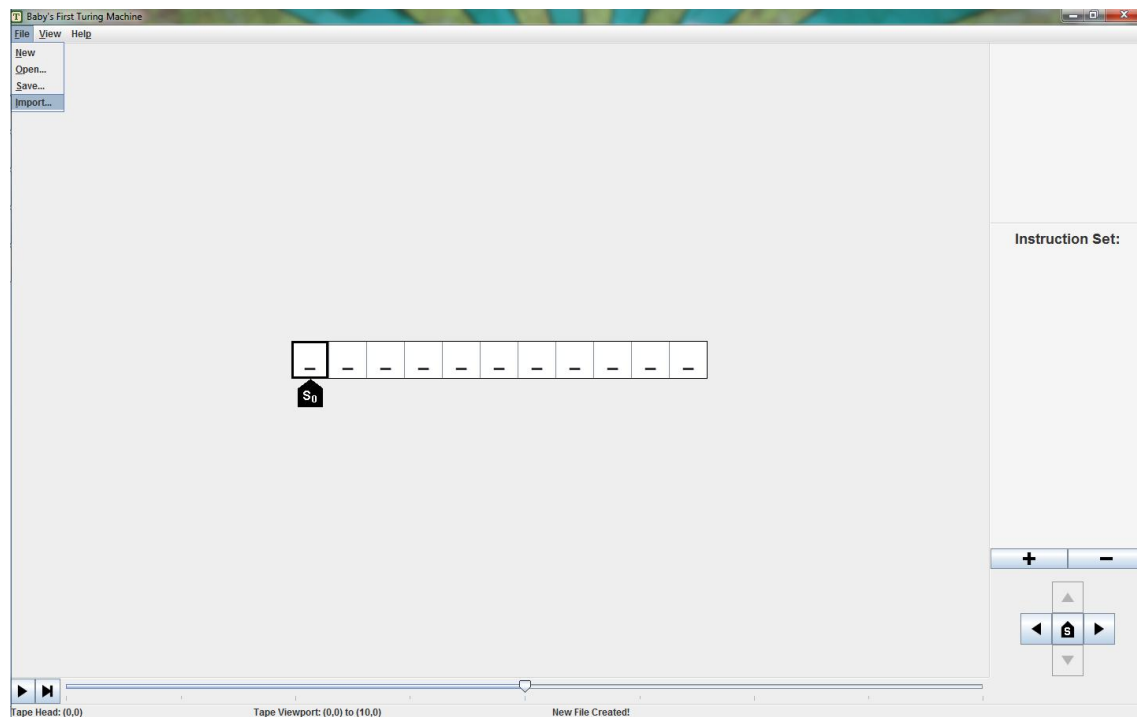
You will then be taken back to your tape as you left it, with a confirmation message to make sure you’ve saved it at the bottom of your screen. For more information on opening the file you just saved, click [here](#).



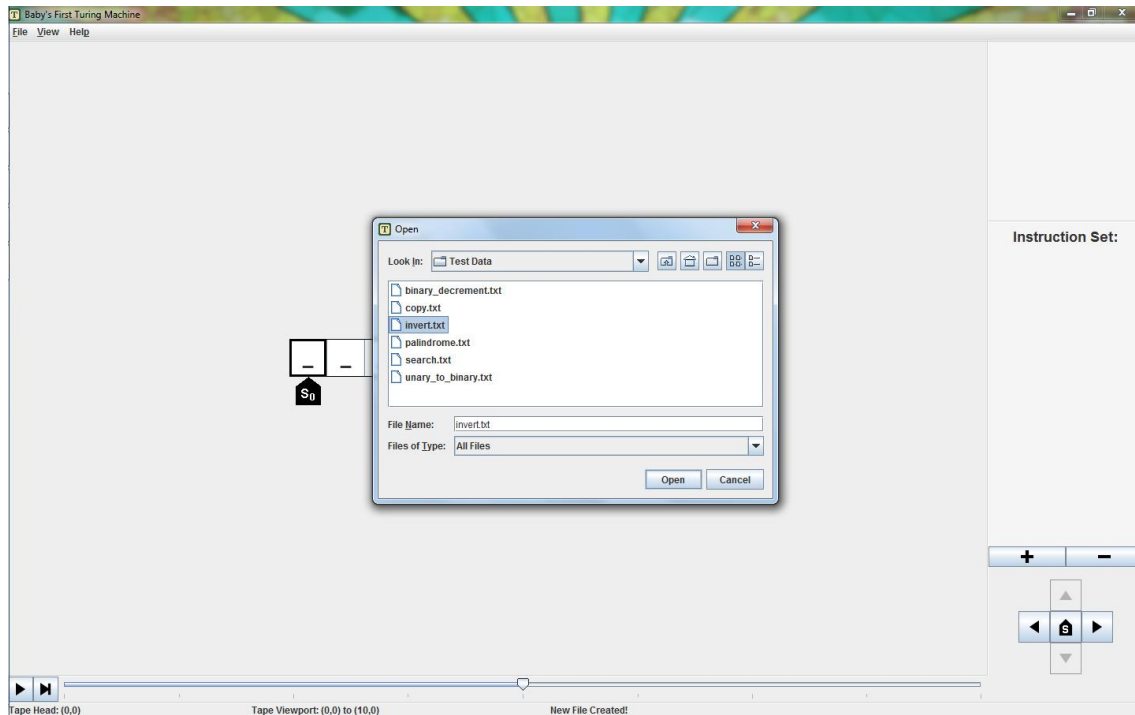
Importing Files

Here's how you import files from plain text file types (such as .txt) that are not the .tsf file, assuming they are in the correct test data format for a Turing Machine Simulator (as illustrated on Heriot-Watt's website). If it is not in that data format, it will not open.

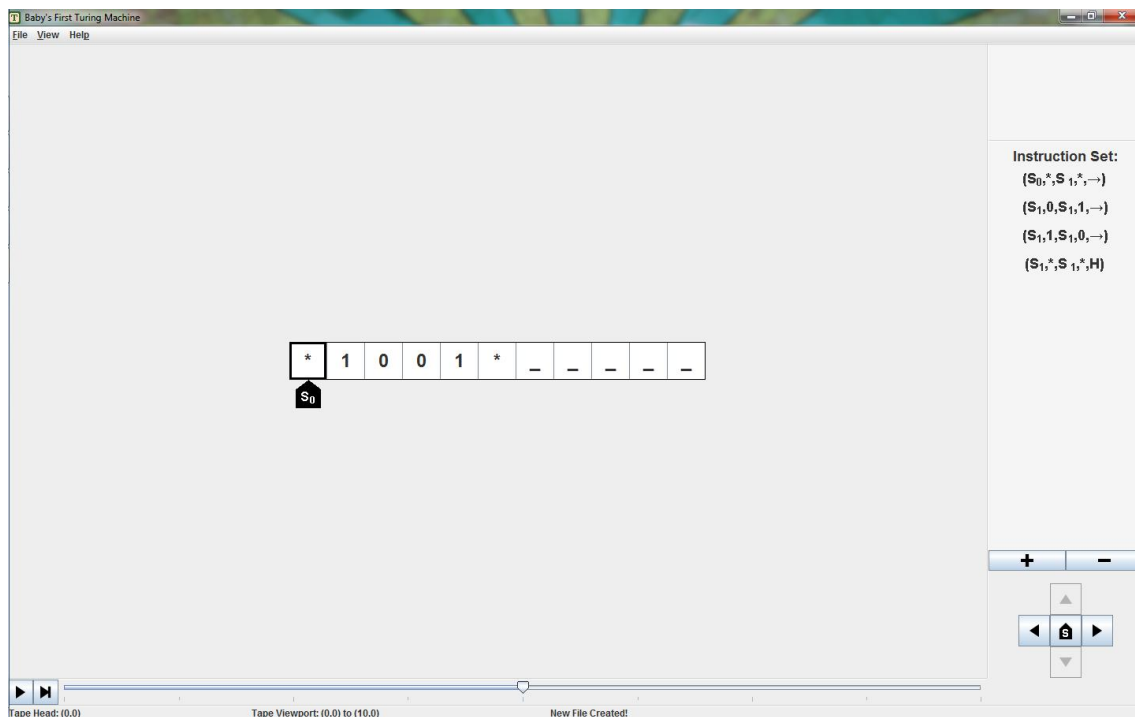
Once you have a .txt (or similar plain text format) file ready to open, click on "Import", located by going to File > Import on the menu bar.



Once you've clicked Import, locate towards the file you want to open (in this example, the test data named "invert.txt" that Heriot-Watt supplied), click on it, then click open, or double click on the file.

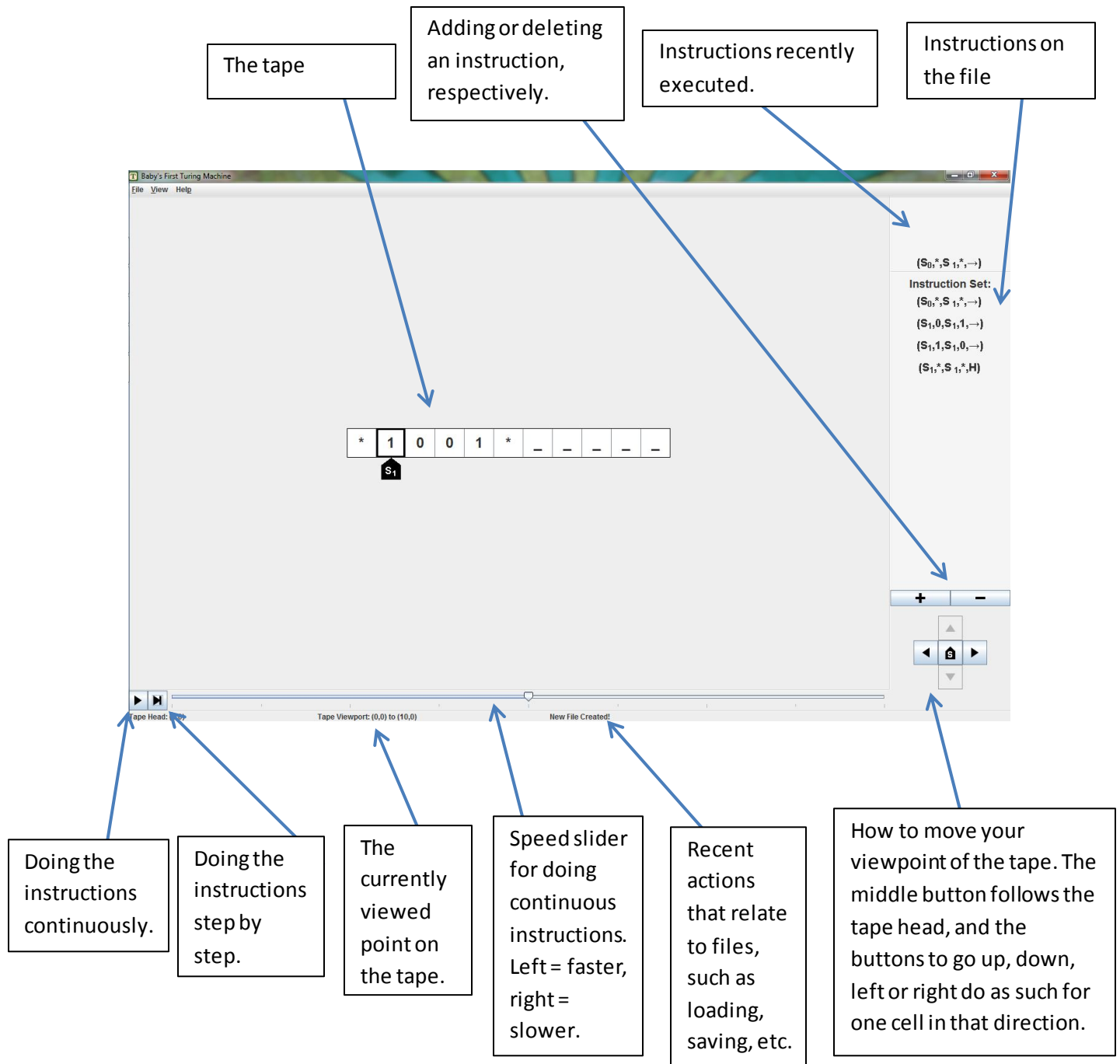


The file will have loaded and you can edit/manipulate/save it however you want as if it was any other file!



The GUI Display

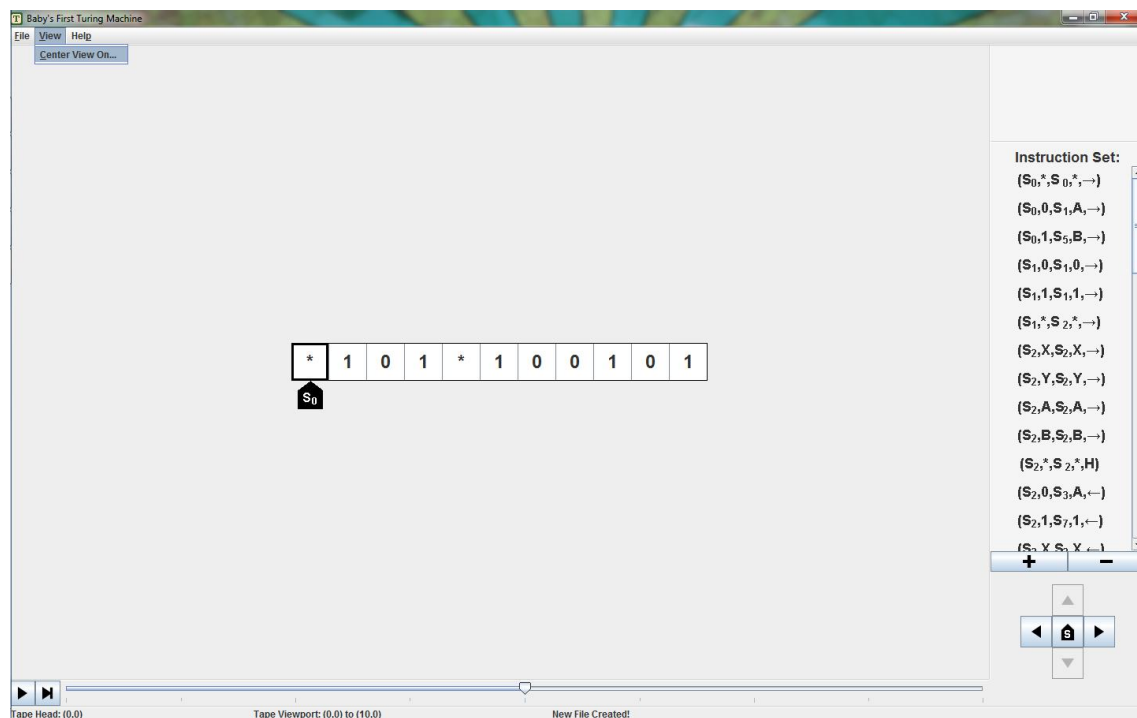
Here's a quick explanation of what does what on the GUI, and where everything is located.



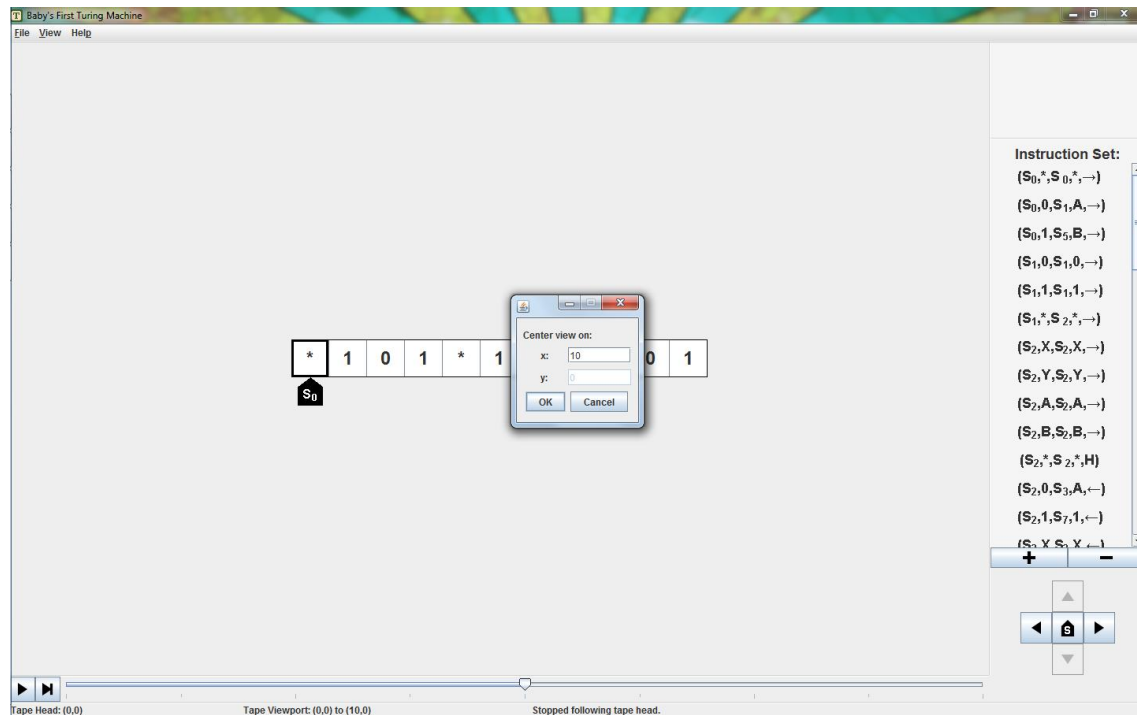
Centring Your View

With this handy feature you can go to any specified cell on a tape from wherever you are without having to go manually one cell along multiple times.

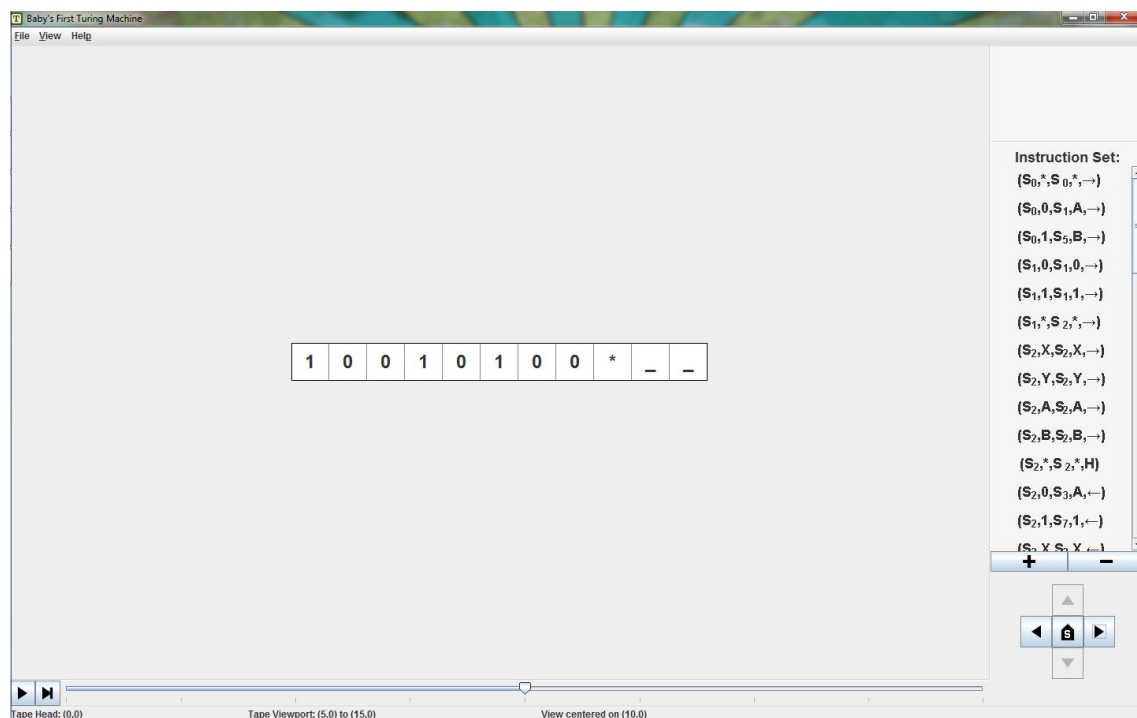
To access this feature, once a tape (either one or two dimensional) has been opened or created and is ready to go, go to View > Centre View On... and click on it.



From this window you can quickly jump to any cell, and it will centre your view around it, hence, if I was to type 0 in both fields, it would show (-5,0) to (5,0). On a one dimensional tape, you do not need the Y axis field, but you can use it for a two dimensional tape with the same effect.

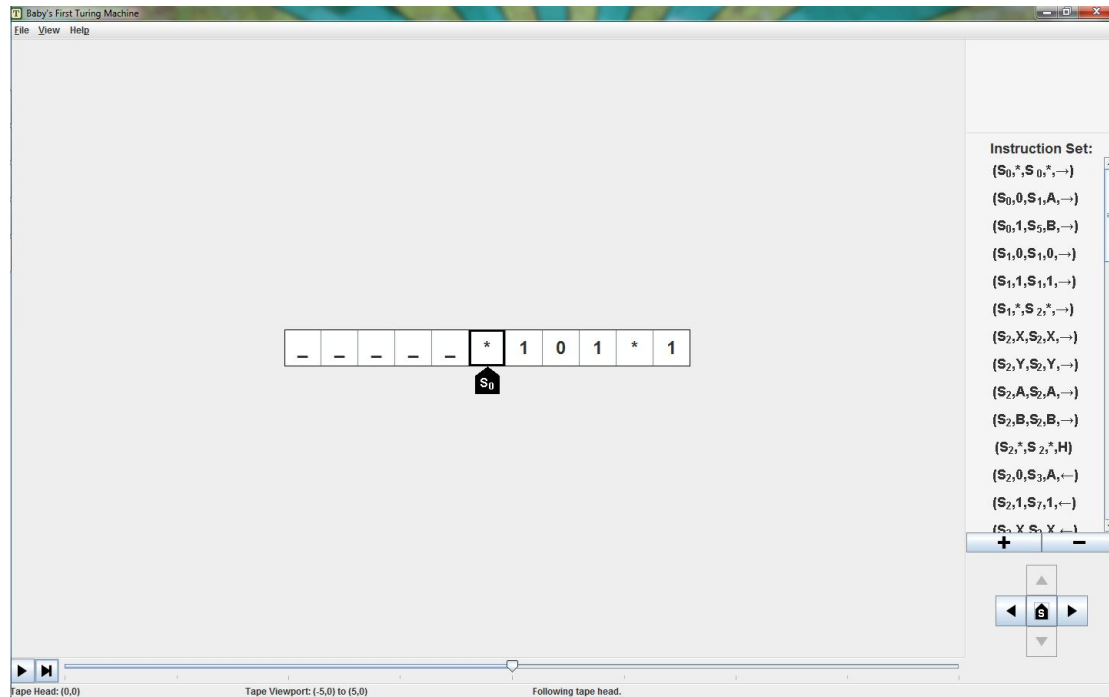


As you can see, it has indeed showed (10,0) in the middle of the display, showing cells (5,0) to (15,0) in my view. I can do anything I could from the start from here, too.

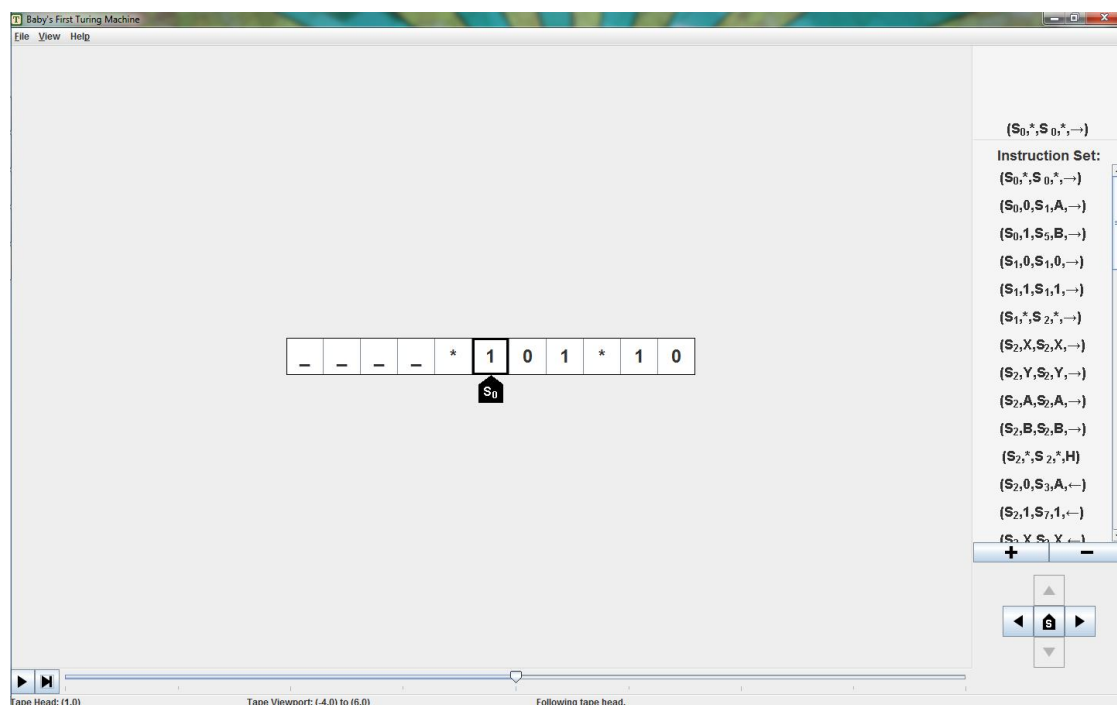


Going Instruction By Instruction

With this button you can do each instruction one at a time, handy if you want to see what each actually does and more directly see cause and effect to the tape.

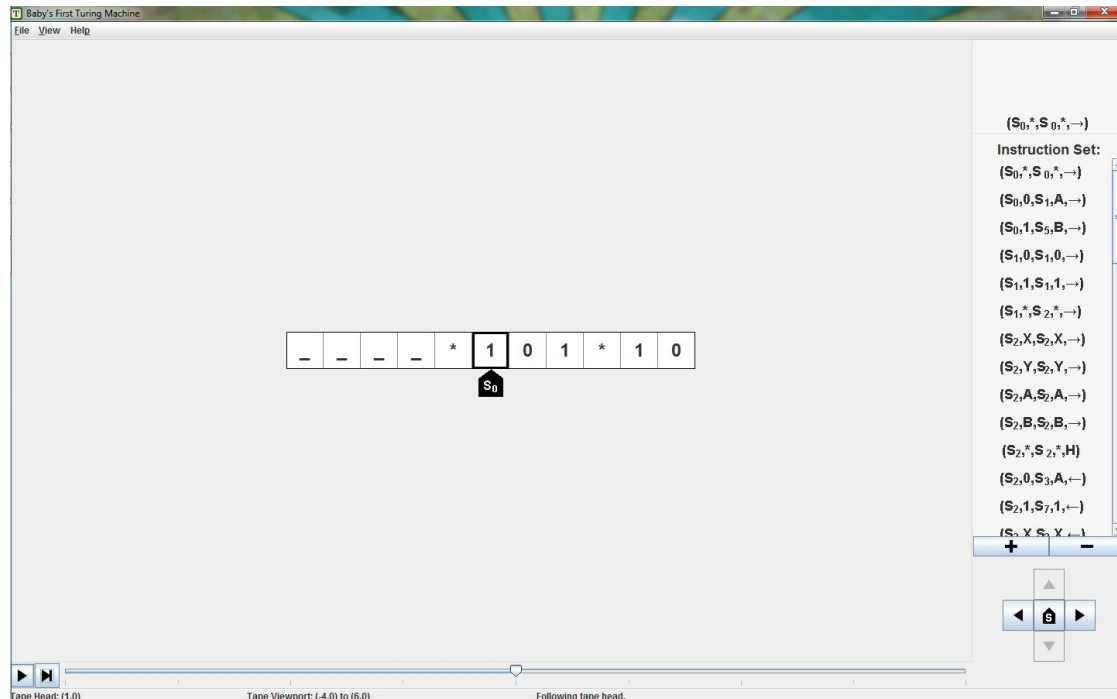


As you can see here, pressing the single instruction button (the button to the right of the bottom left corner) will move it forward one instruction from the set and will add the instruction it just completed to the recent instruction feed above the instruction set.

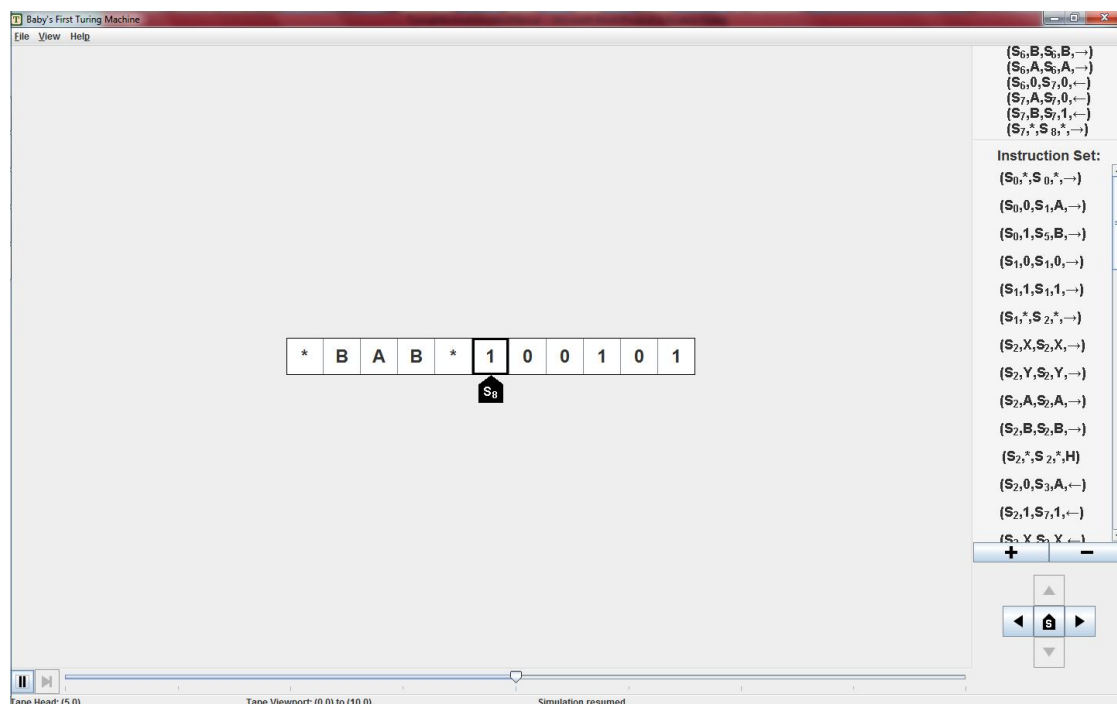


Continuous Mode

With this mode, you can play out your instructions from where ever you want in a tape to go at a certain speed through the instruction set.



All you have to do is just to press the bottom left corner 'play' button, and it will continue from wherever I left off until I press pause, leaving the instructions it does in the feed above the instruction set.

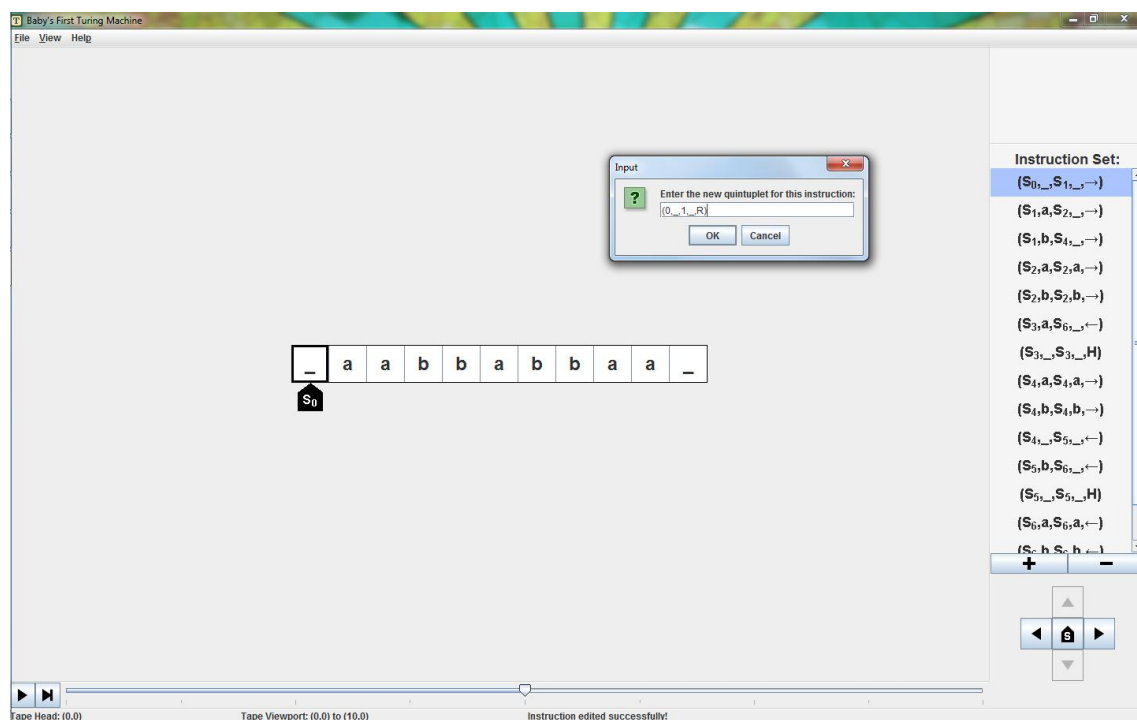


Quintuplet Manipulation

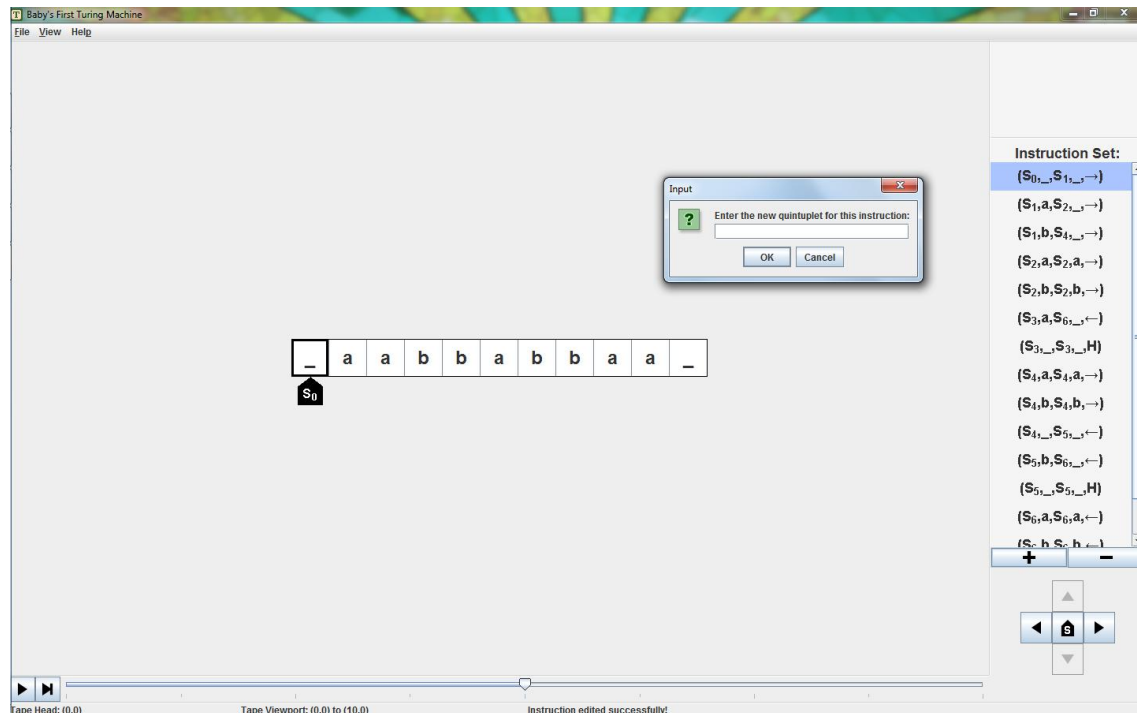
How to manipulate quintuplets in your instruction set so that the tape you want will add or remove the instructions you want.

For this Turing Machine Simulator, “H” is used to symbolise “Halt”, “R” is used to symbolise “Right”, “L” for “Left”, “U” for “Up”, and “D” for “Down” (with the latter two only necessary for two dimensional tapes).

To change, edit or manipulate existing instructions, simply double click on the instruction and the window will appear, as seen below.



To add a new instruction, simply click on the “+” button below the Instruction set and type it in.



To delete an instruction, simply click on an instruction, then click the “-” button below the instruction set and press “OK” to confirm.

