Lab Assignment 3: Turing Machines

Objective: The objective of this lab assignment is to practice working with Turing machines.

Instructions:

- Create a new file and name it "turing_machine.c".
- Implement the following functions:
    - **int simulateTuringMachine(char tape[], char transitions[])**: This function should simulate the execution of a Turing machine on the given input tape using the provided transition function. The function should return 1 if the Turing machine halts and accepts the input, or 0 if it halts and rejects the input. You can use any approach you prefer to implement this function, such as a step-by-step simulation of the Turing machine transitions.
    - **void visualizeTuringMachine(char transitions[])**: This function should take the transition function of a Turing machine as input and generate a visual representation of the machine's states, transitions, and accept/reject states. You can choose any format or visualization technique you prefer for the representation.
- In the **main()** function, provide a menu-driven program to interact with the Turing machine simulation and visualization functions. The menu should provide the following options:
    - Simulate a Turing machine on an input tape
    - Visualize a Turing machine
    - Exit the program
- Test your program with various Turing machines, input tapes, and transition functions to validate the correctness of the simulation and visualization operations.
- Document your code and include appropriate comments to explain the purpose of each function and significant sections of code.
- Submit your code along with a brief report summarizing your implementation, any challenges faced, and how you addressed them.