Furkan Kerem Selimoğlu
S018065

CS 410 - PROJECT 3 DESIGN REPORT

Description

This project will implement a program that simulates a Turing Machine. The program should report if the provided string is accepted, rejected, or looped, as well as the states it visited.

Tools

- Java 15 (JDK-15.0.2): A programming language for project implementation.
- IntelliJ IDEA 2021.1.1: An Integrated Development Environment (IDE).

Implementation

Java program that reads a file containing the definition of a Turing machine, and prints the input alphabet, tape alphabet, blank symbol, states, start state, accept state, and reject state, as well as the lines for the turing machine.

The program begins by importing several Java classes that it uses later: File and Scanner from the java.io package, Array from the java.sql package, and ArrayList from the java.util package.

It then defines an enum type called results, which has three values: accepted, rejected, and looped. An enum is a special type in Java that represents a fixed set of values.

The program's main method begins by trying to open a file located at a specific file path on the computer's file system. If the file can't be found, a FileNotFoundException is thrown. The file is read line by line using a Scanner object, and the lines are stored in an ArrayList called lines.

The program then reads and stores the values of several variables from the file. These include the size of the input alphabet, the input alphabet itself, the size of the tape alphabet, the tape alphabet itself, the blank symbol, the number of states, the states themselves, the start state, the accept state, and the reject state.

The program then prints the values of these variables to the console, along with the lines of the Turing machine stored in the lines ArrayList.

Output:

```
The input alphabet): 0
The tape alphabet): 0, X
Blank symbol: b
States: q1, q2, q3, q4, q5, qA, qR
Start state: q1
Accept state: qA
Reject state: qR

These are the given lines for turing machine:
q1 0 b R q2
q1 b b R qR
q1 X X R qR
q2 0 X R q3
q2 X X R q2
q2 b b R qA
q3 X X R q3
q3 0 0 R q4
q3 b b L q5
q4 X X R q4
q4 0 X R q3
q4 b b R qR
q5 0 0 L q5
q5 X X L q5
q5 b b R q2
```

Furkan Kerem Selimoğlu
S018065

Input Format

The input file will be read on the top of the main function in this format:

1 (number of variables in input alphabet)
0 (the input alphabet)
2 (number of variables in tape alphabet)
0 X (the tape alphabet)
b (blank symbol , it is always a member of tape alphabet, and it does not count in the number of variables in tape alphabet)
7 (number of states)
q1 q2 q3 q4 q5 qA qR (states)
q1 (start state)
qA (accept state)
qR (reject state)
q1 0 b R q2
q1 b b R qR
q1 X X R qR
q2 0 X R q3
q2 X X R q2
q2 b b R qA
q3 X X R q3
q3 0 0 R q4
q3 b b L q5
q4 X X R q4
q4 0 X R q3
q4 b b R qR
q5 0 0 L q5
q5 X X L q5
q5 b b R q2
000 (string to be detected)