Cairo University | Compilers and Languages | Computer Eng. Dept.
Faculty of Engineering | **Programming Assignment #1** | Spring 2022

Requirements:

You are required to build a command line tool that converts a regular expression into its corresponding NFA **(Strictly)** using Thompson’s construction algorithm. You must implement the algorithm yourself without using any libraries. The output should be **exactly as the algorithm output**, don’t optimize by yourself.
Your tool should run like this for example: convert “[A-Za-z]+[0-9]*”

Input format:

The input to the tool is simply a regular expression in text form. The expression may be invalid, so you need to validate it before transforming it first. Example of an invalid regular expression: [A-Za-z

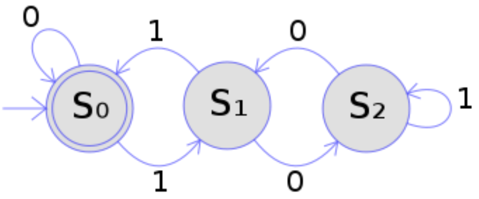
Output format:

You are required to output a JSON file representing the FSM states and transition using the following format:

```
{
  "startingState": "stateA"
  "stateA": {
isTerminatingState: false,
"inputCharacterA": "stateB",
   "inputCharacterB": "stateA"
  },
  "stateB": {
isTerminatingState: true,
"inputCharacterA": "stateB",
   "inputCharacterB": "stateB"
  }
}
```

For example

The following NFA



Would be corresponding to the following JSON:

```
{
  "startingState": "S0"
  "S0": {
    isTerminatingState: true,
    "0": "S0",
    "1": "S1"
  },
  "S1": {
    isTerminatingState: false,
    "0": "S2",
    "1": "S0"
  },
  "S2": {
    isTerminatingState: true,
    "0": "S1",
    "1": "S2"
  }
}
```

You are also required to output an image containing the graph of the NFA, using any graphics library of your choice. You must distinguish between accepting and nonaccepting states. Neat and non-overlapping graphs are a bonus.