

# Laboratory 4

- Antonio Suciu, 937/1 –

## [Github link](#)

Write a program that:

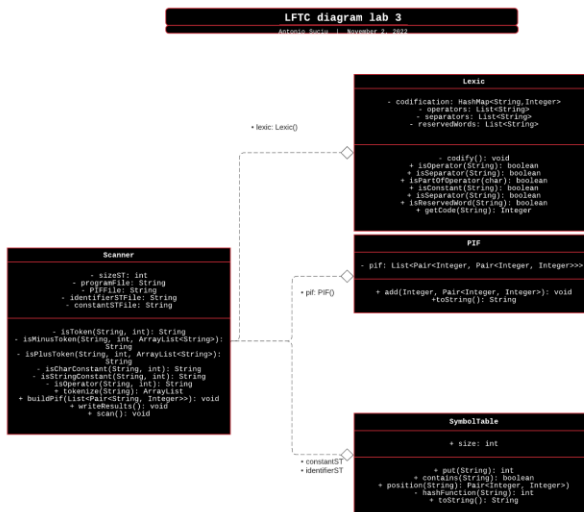
1. Reads the elements of a FA (from file).
2. Displays its elements, using a menu: the set of states, the alphabet, all the transitions, the initial state and the set of final states.
3. For a DFA, verifies if a sequence is accepted by the FA.

## Deliverables:

1. FA.in - input file (*on Github*)
2. Source code (*on Github*)
3. Documentation. It should also include in BNF or EBNF format the form in which the FA.in file should be written (*on Moodle and Github*)

**Max grade = 9**

**Max grade = 10:** Use FA to detect tokens <identifier> and <integer constant> in the scanner program



### Finite Automaton Class

- Alphabet
- States
- initialState
- finalStates

^ sets of strings

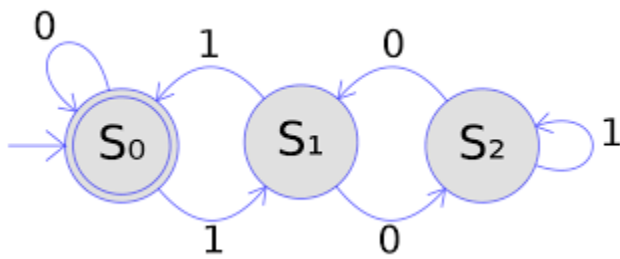
- transitions ( map, keys: Pair(Source state, value to access the destination state), values: set of Destination states)
- DFA  $\Leftrightarrow$  Destination states set has size 1 (there can be only 1 destination)

Check that FA = DFA: We use the above stated condition

Check that a sequence is accepted by the DFA:

- We start from the initial state
- We iterate through the characters of the sequence
- We check that the pair (currentState, valueOfCurrentChar) is mapped to a set with a single value
- If it is, we have our new current state in for the given iteration
- If we find no mapping => it means it is not accepted

### Finite Automata



```

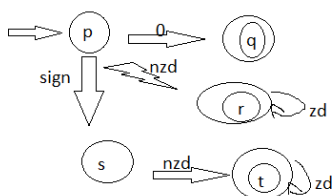
p q r
0 1
p
p
p 0 p
p 1 q
q 1 p
q 0 r
r 0 q
r 1 r

```

$\text{letter} ::= a \mid b \mid \dots z \mid A \dots Z$   
 $\text{digit} ::= 0 \mid 1 \mid \dots 9$   
 $\text{alphabet\_char} ::= \text{letter} \mid \text{digit}$   
 $\text{alphabet} ::= \{\text{alphabet\_char}\}^+$   
 $\text{state} ::= \text{letter}$   
 $\text{states} ::= \{\text{state}\}^+$   
 $\text{initial\_state} ::= \text{state}$   
 $\text{final\_state} ::= \{\text{state}\}^+$   
 $\text{transition} ::= \text{state alphabet state}$

Integer numbers:

- $\text{nzd} ::= 1 \mid 2 \mid \dots 9$
- $\text{zd} ::= 0 \mid 1 \mid 2 \mid \dots 9$
- $\text{sign} ::= + \mid -$
- $\text{zero} : 0$



Variable declaration

- $\text{letters} : a \mid b \mid \dots z \mid A \dots Z$
- $\text{digits} : 0 \mid \dots 9$
- $\text{variable} : \text{letter} \{\text{letter} \mid \text{digit}\}^*$

