



UNIVERSIDAD AUTÓNOMA DEL ESTADO DE HIDALGO

Instituto de ciencias basicas e ingenieria

Licenciatura en Ciencias Computacionales

Quinto Semestre Grupo-3

Automatas y Compiladores

“Práctica. AFD y AFND”

Alumno:

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Ejercicio 1. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{0, 1\}$, que acepte el conjunto de palabras que inician en “0”.

$F = \{s0\}$

$\Sigma = \{0, 1\}$

$Q = \{\text{start}, s0, s1\}$

$q_0 = \text{start}$

$f(\text{start}, 0) = s0$

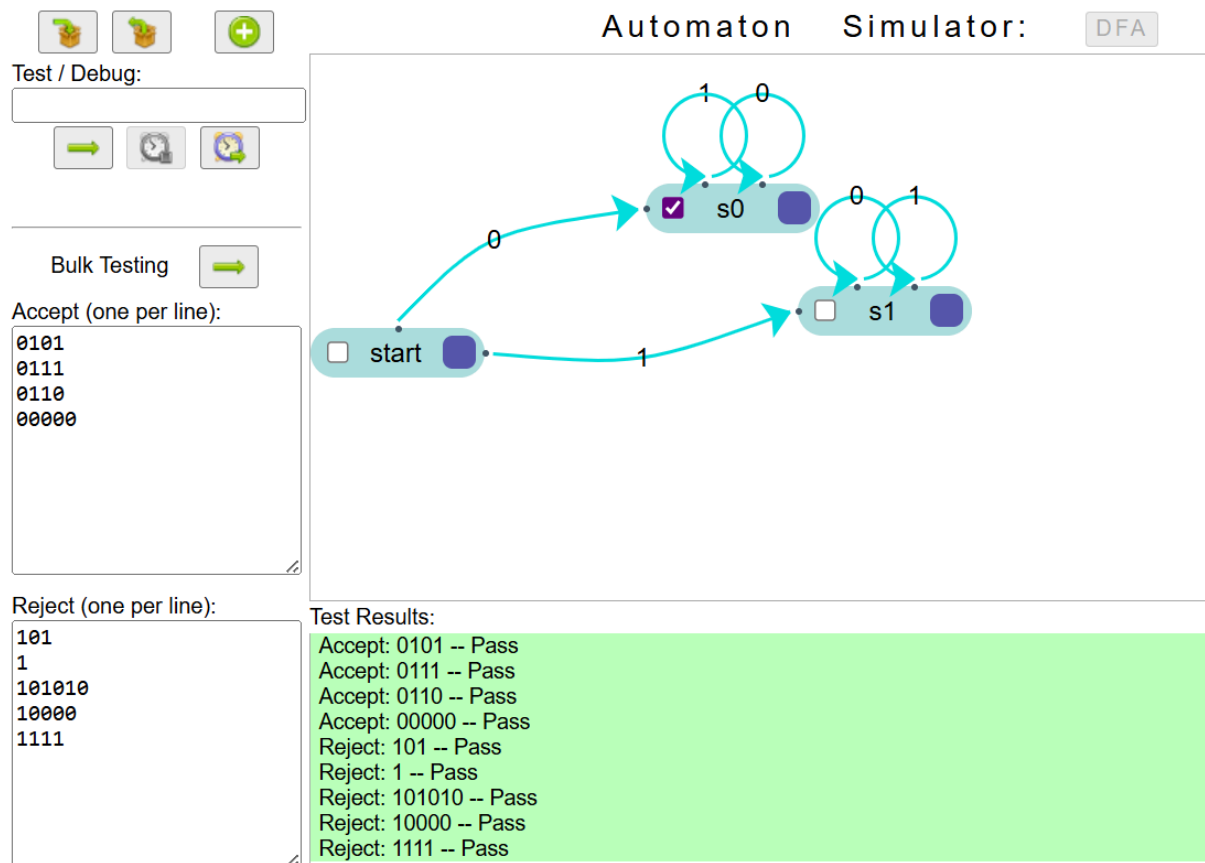
$f(s0, 0) = s0$

$f(s0, 1) = s0$

$f(\text{start}, 1) = s1$

$f(s1, 0) = s1$

$f(s1, 1) = s1$



Ejercicio2. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{0, 1\}$, que acepte el conjunto de palabras que terminan en "1".

$F = \{s0\}$

$\Sigma = \{0, 1\}$

$Q = \{\text{start}, s0, s1\}$

$q_0 = \text{start}$

$f(\text{start}, 0) = s0$

$f(\text{start}, 1) = s1$

$f(s0, 0) = s0$

$f(s0, 1) = s1$

$f(s1, 1) = s1$



Test / Debug:



Bulk Testing



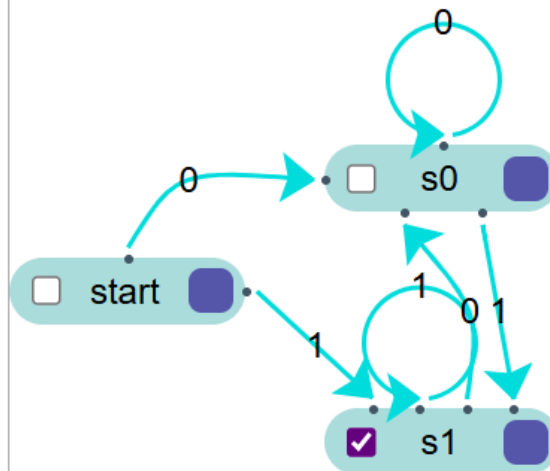
Accept (one per line):

```
00001
0001
10101
```

Reject (one per line):

```
01010
11110
1000
```

Automaton



Test Results:

Accept: 00001 -- Pass
 Accept: 0001 -- Pass
 Accept: 10101 -- Pass
 Reject: 01010 -- Pass
 Reject: 11110 -- Pass
 Reject: 1000 -- Pass

Ejercicio 3. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{0, 1\}$, que acepte el conjunto de palabras que contienen la subcadena "01".

$F = \{S1\}$

$\Sigma = \{0, 1\}$

$Q = \{\text{start}, s0, s1\}$

$q_0 = \text{start}$

$f(\text{start}, 1) = \text{Start}$




$f(\text{start}, 0) = s0$

$f(s0, 0) = s0$




$f(s0, 1) = s1$


$f(s1, 1) = s1$

$f(s1, 0) = s1$

Test / Debug:

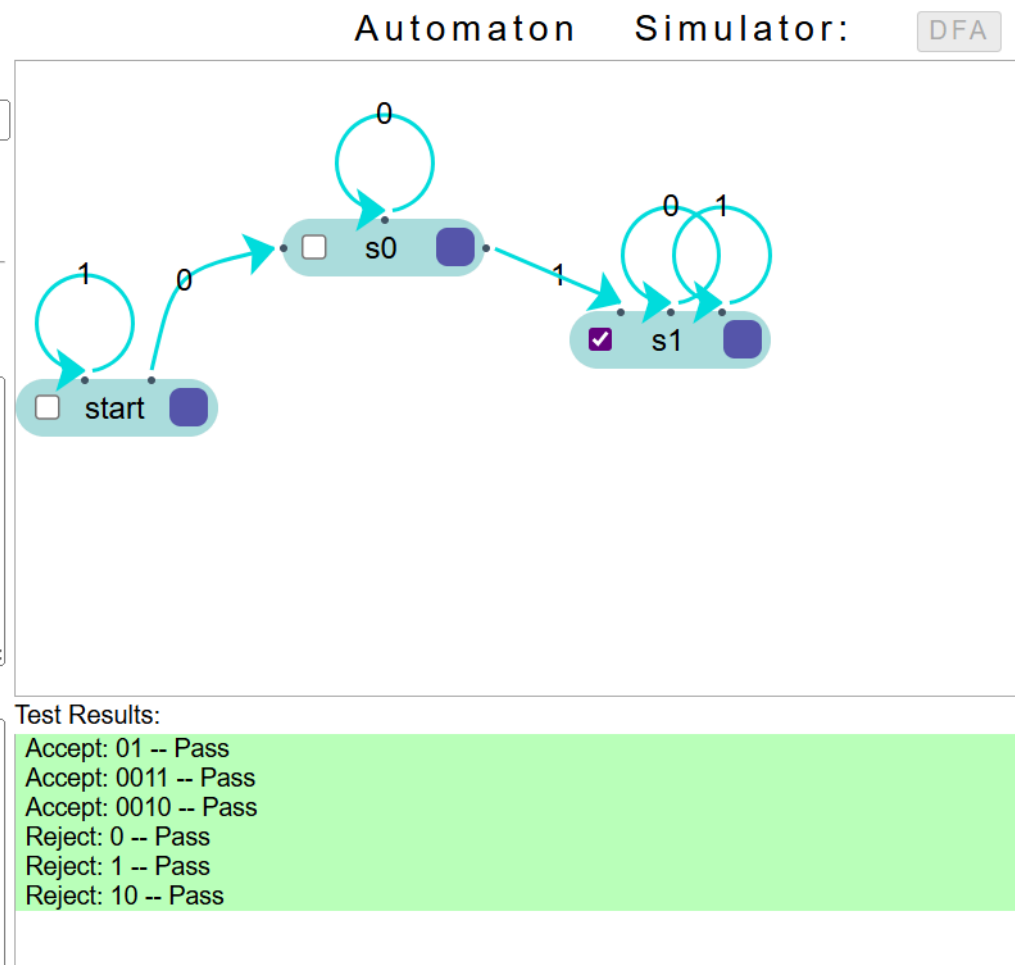
Bulk Testing 

Accept (one per line):

```
01
0011
0010
```

Reject (one per line):

```
0
1
10
```



Ejercicio 4. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{0, 1\}$, que acepte el conjunto de palabras que no contienen la subcadena "01".

$F = \{S_0, S_1\}$

$\Sigma = \{0, 1\}$

$Q = \{\text{start}, S_0, S_1\}$

$q_0 = \text{start}$

$f(\text{start}, 1) = S_0$

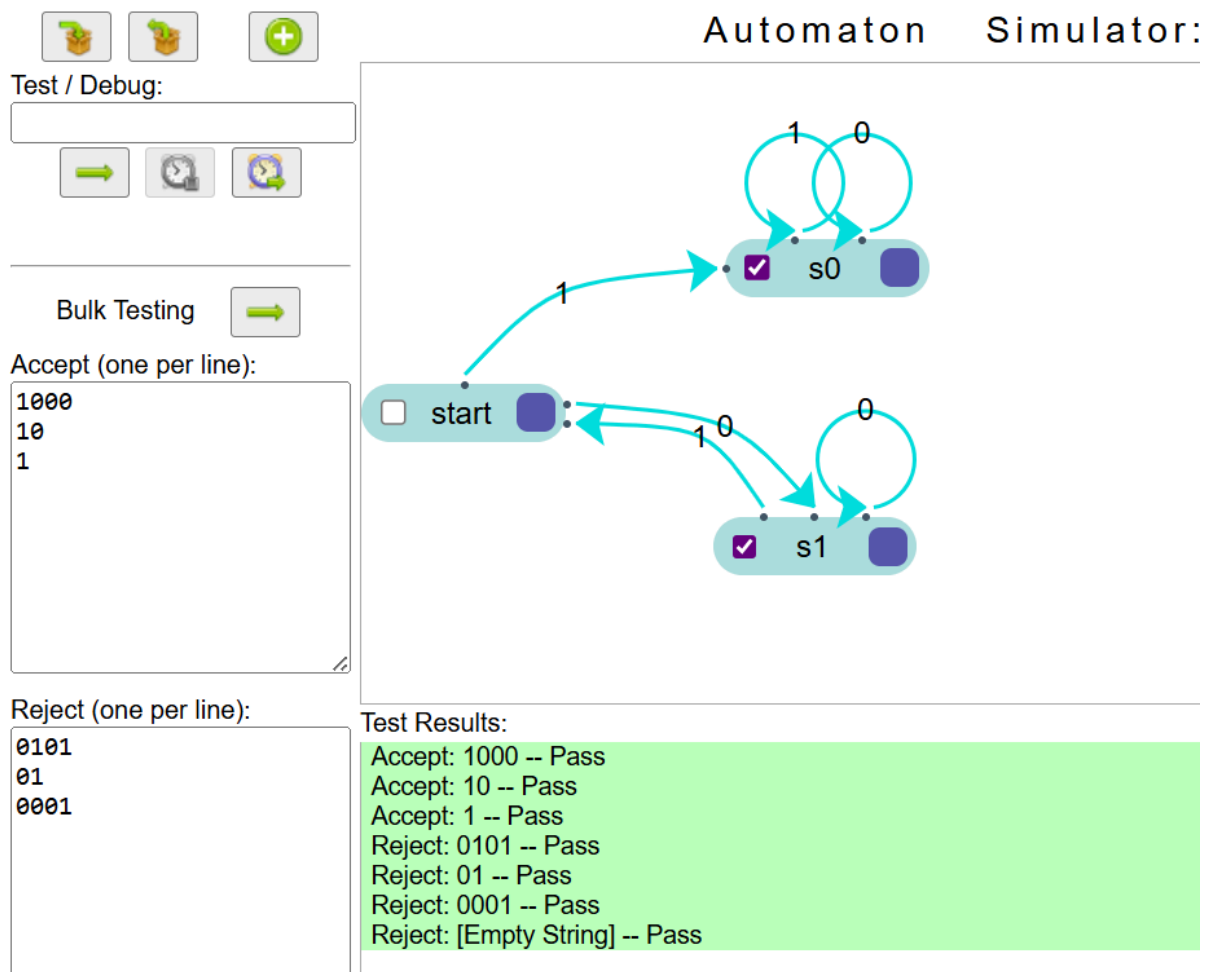
$f(\text{start}, 0) = S_1$

$f(S_0, 0) = S_0$

$f(S_0, 1) = S_0$

$f(S_1, 1) = \text{start}$

$f(S_1, 0) = s_1$



Ejercicio 5. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{a, b, c\}$, que acepte el conjunto de palabras que inician con la subcadena “ac” o terminan con la subcadena “ab”.

$F = \{\}$

$\Sigma = \{a, b, c\}$

$Q = \{\text{start}, S_0, S_1, S_2\}$

$q_0 = \text{start}$

$f(\text{START}, a) = S_0$

$f(S_0, c) = S_2$

$f(S_0, b) = S_1$

$f(S_2, a) = S_2$

$f(S_2, b) = S_2$

$f(S_2, c) = S_2$

$f(S_1, b) = S_1$

$f(\text{START}, b) = S_3$

$f(S_1, a) = S_5$

$f(S_1, b) = S_3$

$f(S_1, c) = S_4$

$f(S_3, b) = S_3$

$f(S_3, a) = S_5$

$f(S_3, c) = S_4$

$f(S_4, b) = S_3$

$f(S_4, a) = S_5$

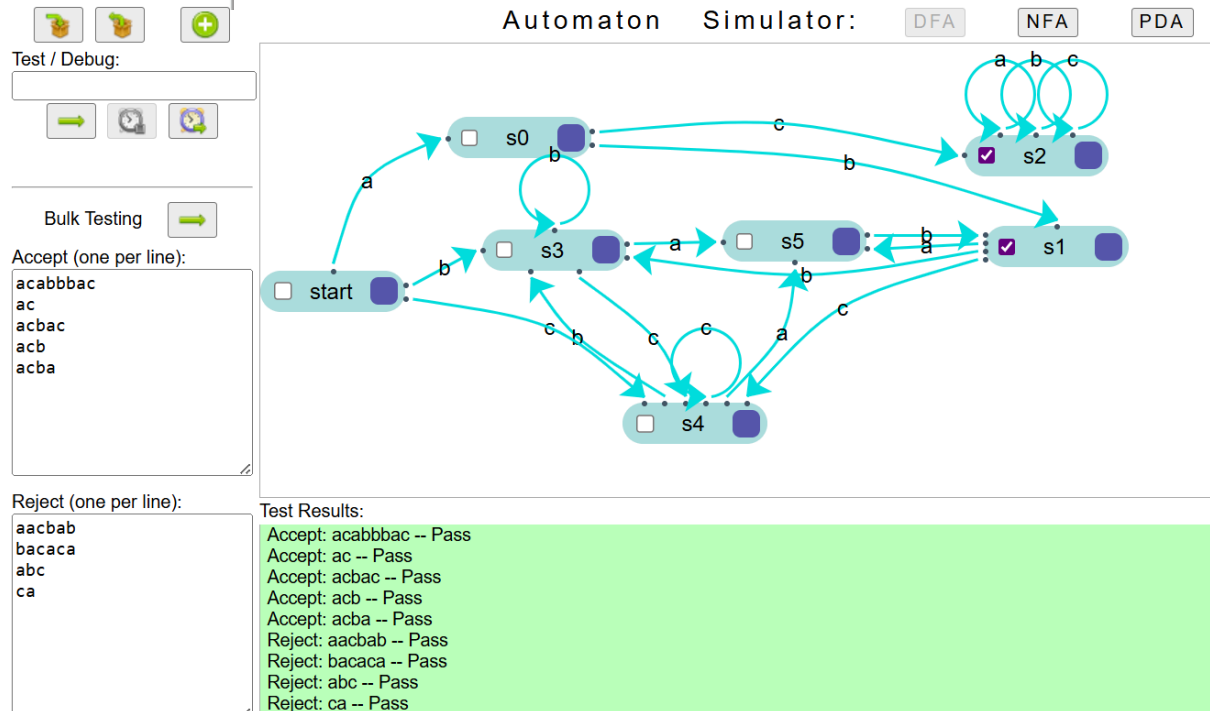
$f(S_4, c) = S_4$

$f(S_5, a) = S_5$

$f(S_5, c) = S_4$

$f(S_5, b) = S_1$

$f(\text{START}, c) = S_4$



Ejercicio 6. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{a, b, c\}$, que acepte el conjunto de palabras que inician con la subcadena “ac” y no terminan con la subcadena “ab”.

$$\Sigma = \{a, b, c\}$$

$$Q = \{\text{START}, S_0, S_1, S_2\}$$

$$q_0 = \text{START}$$

$$F = \{S_3\}$$

$$f(\text{START}, a) = S_0$$

$$f(\text{START}, b) = S_1$$

$$f(S_0, b) = S_1$$

$$f(S_0, c) = S_3$$

$$f(\text{START}, c) = \text{START}$$

$$f(S_1, c) = S_1$$

$$f(S_3, a) = S_3$$

$$f(S_3, b) = S_3$$

$$f(S_3, c) = S_3$$

Test / Debug:



Bulk Testing

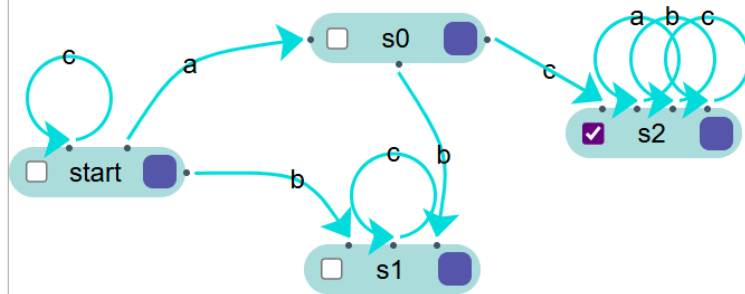


Accept (one per line):

```
acabbbac
ac
acbac
acb
acba
```

Reject (one per line):

```
ab
aacbab
bacaca
abc
ca
```



Test Results:

```
Accept: acabbbac -- Pass
Accept: ac -- Pass
Accept: acbac -- Pass
Accept: acb -- Pass
Accept: acba -- Pass
Reject: ab -- Pass
Reject: aacbab -- Pass
Reject: bacaca -- Pass
Reject: abc -- Pass
Reject: ca -- Pass
```

Ejercicio 7. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{a, b, c\}$, que acepte el conjunto de palabras que inician con la subcadena “ac” o no terminan con la subcadena “ab”.

$\Sigma = \{a, b, c\}$

$Q = \{START, S_0, S_1, S_2, S_3, S_4, S_5\}$

$q_0 = START$

$F = \{S_2, S_3, S_4, S_5\}$

$f(START, a) = S_0$

$f(S_0, c) = S_2$

$f(S_0, b) = S_1$

$f(S_2, a) = S_2$

$f(S_2, b) = S_2$

$f(S_2, c) = S_2$

$f(S_1, b) = S_1$

$f(START, b) = S_3$

$f(S_1, a) = S_5$

$f(S1, b) = S3$

$f(S1, c) = S4$

$f(S3, b) = S3$

$f(S3, a) = S5$

$f(S3, c) = S4$

$f(S4, b) = S3$

$f(S4, a) = S5$

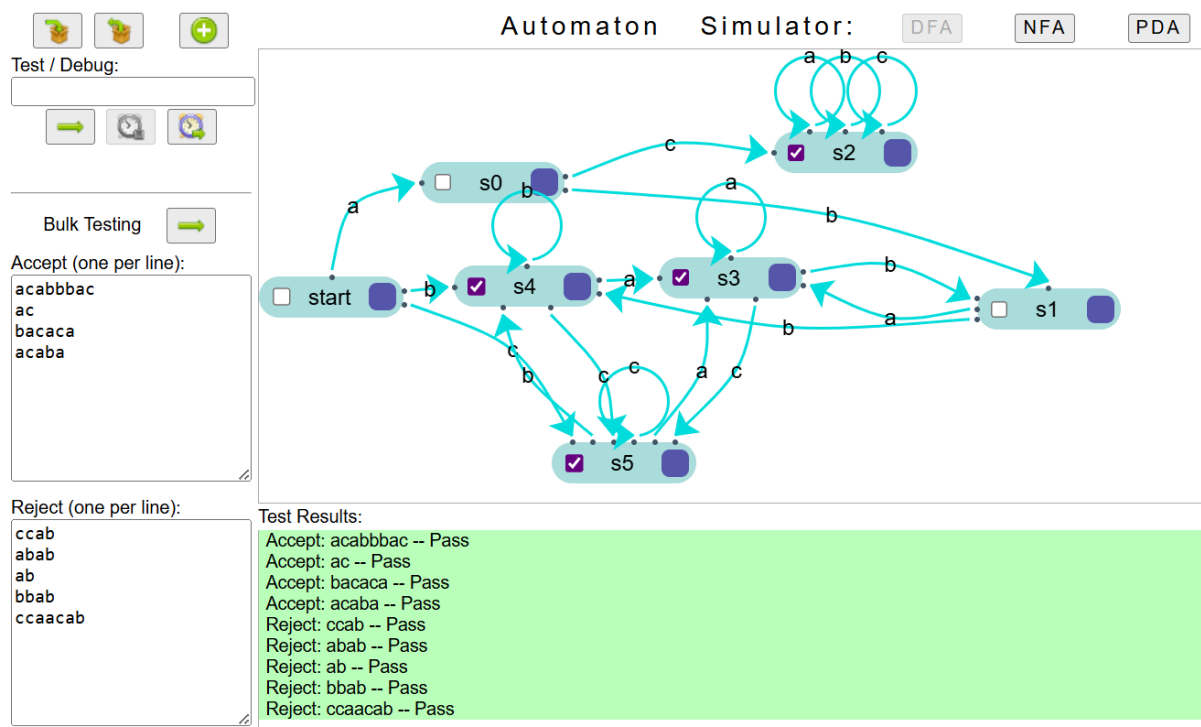
$f(S4, c) = S4$

$f(S5, a) = S5$

$f(S5, c) = S4$

$f(S5, b) = S1$

$f(\text{START}, c) = S4$



Ejercicio 8. Obtenga un Autómata Finito Determinista (AFD) dado el lenguaje definido en el alfabeto $\Sigma = \{a, b, c\}$, que acepte el conjunto de palabras que no inician con la subcadena “ac” y no terminan con la subcadena “ab”.

$\Sigma = \{a, b, c\}$

$Q = \{\text{START}, S0, S1, S2, S3, S4, S5\}$

$q0 = \text{START}$



$$F = \{S_3, S_4, S_5\}$$

$$f(\text{START}, a) = S_0$$

$$f(S_0, c) = S_2$$

$$f(S_0, b) = S_1$$

$$f(S_2, a) = S_2$$

$$f(S_2, b) = S_2$$

$$f(S_2, c) = S_2$$

$$f(S_1, b) = S_1$$

$$f(\text{START}, b) = S_3$$

$$f(S_1, a) = S_5$$

$$f(S_1, b) = S_3$$

$$f(S_1, c) = S_4$$

$$f(S_3, b) = S_3$$

$$f(S_3, a) = S_5$$

$$f(S_3, c) = S_4$$

$$f(S_4, b) = S_3$$

$$f(S_4, a) = S_5$$

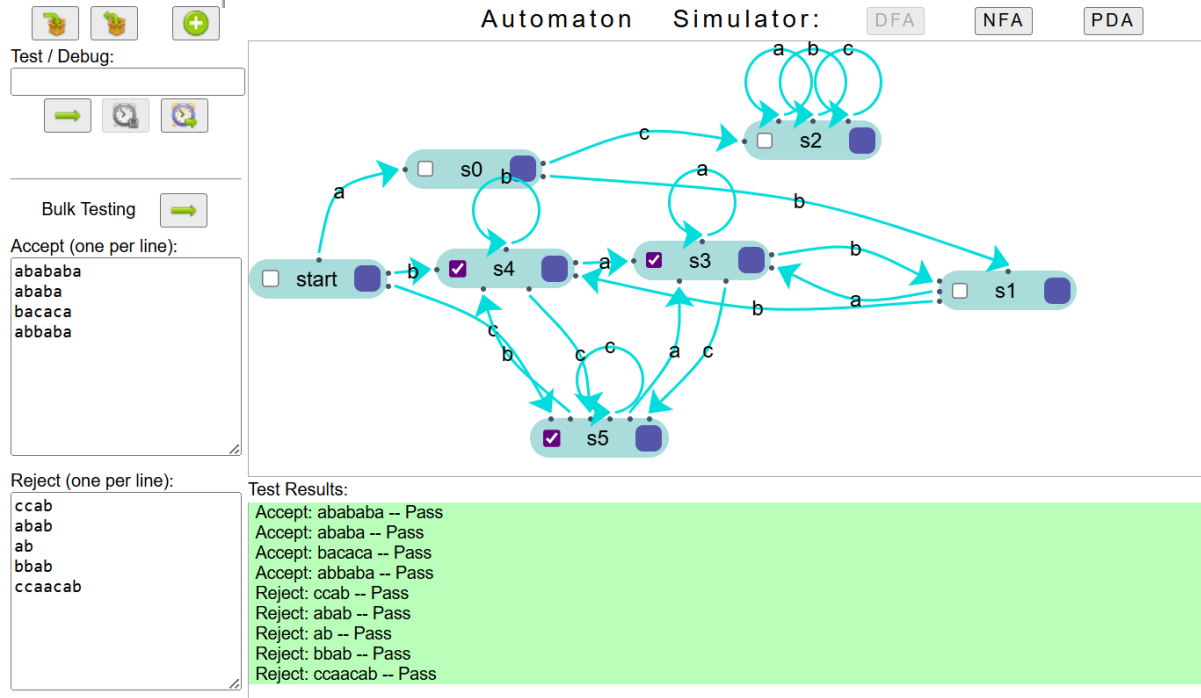
$$f(S_4, c) = S_4$$

$$f(S_5, a) = S_5$$

$$f(S_5, c) = S_4$$

$$f(S_5, b) = S_1$$

$$f(\text{START}, c) = S_4$$



Ejercicio 9. Obtenga un Autómata Finito No Determinista (AFND) dado el lenguaje definido en el alfabeto $\Sigma = \{0, 1\}$, que acepte el conjunto de palabras que no contienen la subcadena “01”.

$$\Sigma = \{0, 1\}$$

$$Q = \{\text{START}, S_0, S_1, S_2\}$$

$$q_0 = \text{START}$$

$$F = \{S_0, S_2\}$$

$$f(\text{START}, 0) = S_0$$

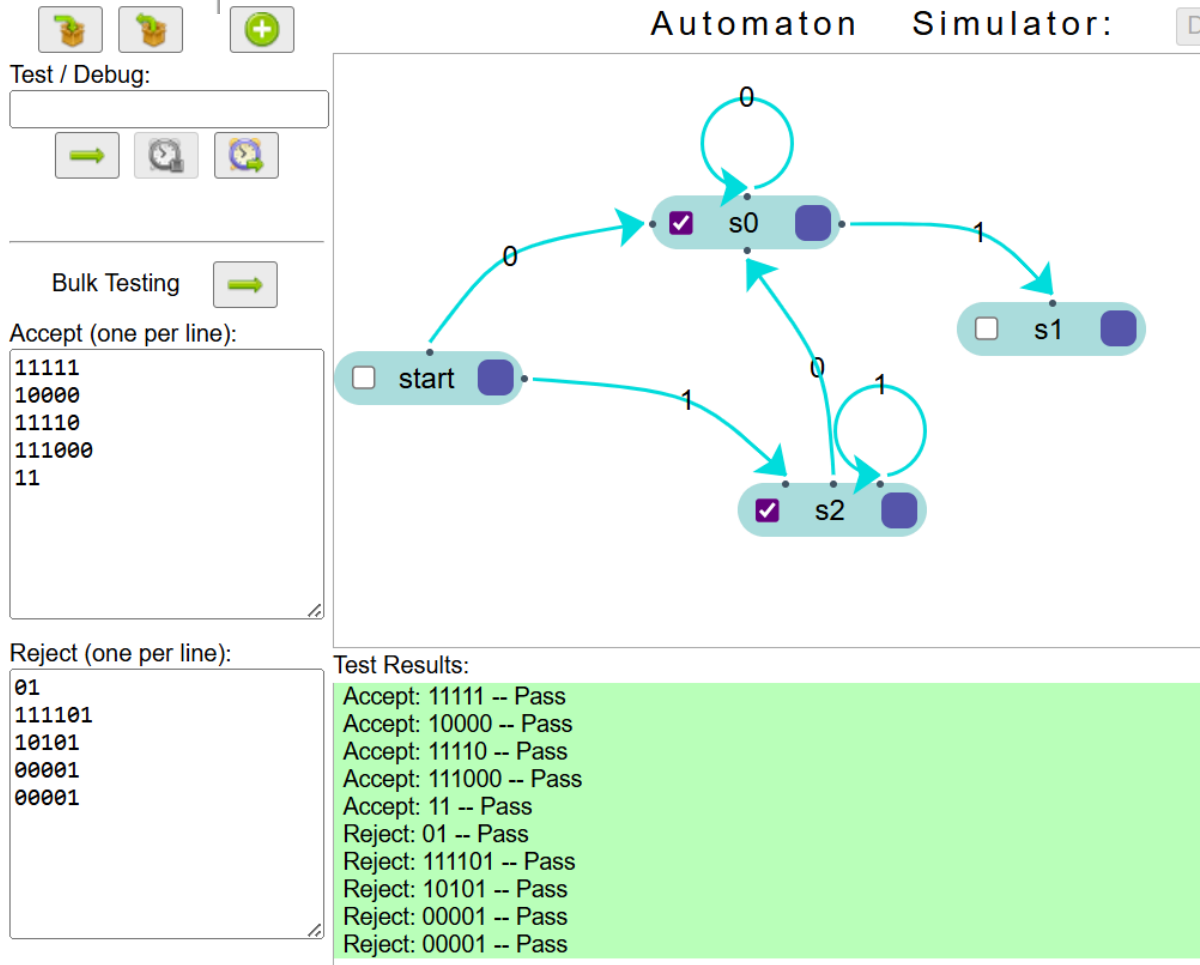
$$f(\text{START}, 1) = S_2$$

$$f(S_0, 0) = S_0$$

$$f(S_0, 1) = S_1$$

$$f(S_2, 0) = S_0$$

$$f(S_2, 1) = S_2$$



Ejercicio 10. Obtenga un Autómata Finito No Determinista (AFND) dado el lenguaje definido en el alfabeto $\Sigma = \{a, b, c\}$, que acepte el conjunto de palabras que inician en la subcadena “ac” y terminan en la subcadena “ab”.

$\Sigma = \{a, b, c\}$

$Q = \{\text{START}, S_0, S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8\}$

$q_0 = \text{START}$

$F = \{S_3\}$

$f(\text{START}, a) = S_0$

$f(\text{START}, b) = S_6$

$f(\text{START}, c) = S_7$

$f(S_0, c) = S_1$

$f(S_0, a) = S_8$

$f(S_0, b) = S_6$



$$f(S_1, b) = S_4$$

$$f(S_1, a) = S_2$$

$$f(S_1, c) = S_5$$

$$f(S_2, a) = S_2$$

$$f(S_2, b) = S_3$$

$$f(S_2, c) = S_5$$

$$f(S_4, a) = S_2$$

$$f(S_4, b) = S_4$$

$$f(S_4, c) = S_5$$

$$f(S_5, a) = S_2$$

$$f(S_5, b) = S_4$$

$$f(S_5, c) = S_5$$

$$f(S_6, a) = S_8$$

$$f(S_6, b) = S_6$$

$$f(S_6, c) = S_7$$

$$f(S_7, a) = S_8$$

$$f(S_7, b) = S_6$$

$$f(S_7, c) = S_7$$

$$f(S_8, a) = S_8$$

$$f(S_8, b) = S_6$$

$$f(S_8, c) = S_7$$

Test / Debug:

Bulk Testing

Accept (one per line):

```
acab
acbbbbcab
accab
acbbbab
acaaab
```

Reject (one per line):

```
bab
cabcba
acbabc
abcba
ababb
```

Automaton Simulator: DFA NFA PT

```

graph LR
    start((start)) -- a --> s0((s0))
    start -- b --> s6((s6))
    start -- c --> s7((s7))
    s0 -- a --> start
    s0 -- b --> s1((s1))
    s0 -- c --> s2((s2))
    s1 -- a --> s2
    s1 -- b --> s4((s4))
    s1 -- c --> s6
    s2 -- a --> s2
    s2 -- b --> s3(((s3)))
    s2 -- c --> s5((s5))
    s3 -- a --> s2
    s3 -- b --> s3
    s3 -- c --> s5
    s4 -- a --> s5
    s4 -- b --> s1
    s4 -- c --> s6
    s5 -- a --> s2
    s5 -- b --> s5
    s5 -- c --> s2
    s6 -- a --> s6
    s6 -- b --> s7
    s6 -- c --> s0
    s7 -- a --> s8((s8))
    s7 -- b --> s6
    s7 -- c --> s7
    s8 -- a --> s8
    s8 -- b --> s6
    s8 -- c --> s7
  
```

Test Results:

```

Accept: acab -- Pass
Accept: acbbbbcab -- Pass
Accept: accab -- Pass
Accept: acbbbab -- Pass
Accept: acaaab -- Pass
Reject: bab -- Pass
Reject: cabcba -- Pass
Reject: acbabc -- Pass
Reject: abcba -- Pass
Reject: ababb -- Pass
  
```