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**Disciplina:** Teoria da Computação

**Curso:** Mestrado/Doutorado Acadêmico em Ciências da Computação

**Programa:** PPGCC-UECE

## **Tema 7: Autômato de pilha**

### **Exemplos**

**Fortaleza, 23 de outubro de 2023**

## Stack Automaton Examples

- 1) Language  $\{0^n 1^n \mid n > 0\}$ .
- 2) Language  $\{ww^R \mid w \in \{0,1\}^*\}$
- 3) Language  $\{0^i 1^j 2^k \mid i=j \text{ ou } i=k \text{ com } n \geq 1\}$
- 4) Language  $\{0^n 1^n \mid n \geq 0\}$ .
- 5) Language  $\{w \in \{a,b\}^* \mid w=a^n b^n \text{ ou } w=b^n a^n \text{ com } n \geq 0\}$
- 6) Language  $\{w \in \{a,b\}^* \mid \text{the quantity of 'a' symbols is equal to the quantity of 'b' symbols}\}$
- 7) Language  $L = \{a^n b^m a^{n+m} \mid n \geq 0, m \geq 0\}$

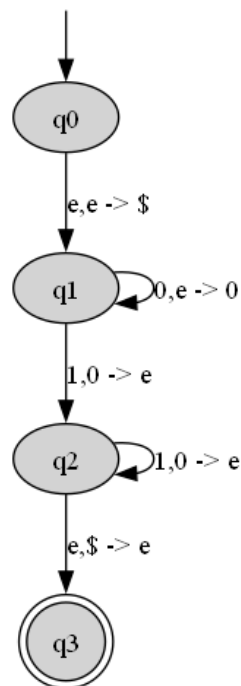
## Stack Automaton Examples

1) Language  $\{0^n 1^n \mid n > 0\}$ .

Test cases:

Test ID	Word	Expected result	Obtained Result
1	01	Accept	Accepted
2	0011	Accept	Accepted
3	000111	Accept	Accepted
4	0	Reject	Rejected
5	1	Reject	Rejected
6	001	Reject	Rejected
7	011	Reject	Rejected

Pushdown automata: Example\_1



Prompt de Comando

```
C:\Users\Daniel\Documents\GitHub\pushdown_automata\PA\debug>PA.exe
### A single one transition is possible.
Going from state 0 to 1
The transition is: e , e -> $

Following the transition.
### A single one transition is possible.
Going from state 1 to 1
The transition is: 0 , e -> 0

Following the transition.
### A single one transition is possible.
Going from state 1 to 2
The transition is: 1 , 0 -> e

Following the transition.
### A single one transition is possible.
Going from state 2 to 3
The transition is: e , $ -> e

Following the transition.

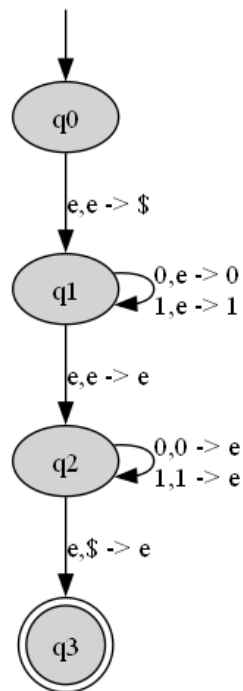
C:\Users\Daniel\Documents\GitHub\pushdown_automata\PA\debug>
```

2) Language  $\{ww^R \mid w \in \{0,1\}^*\}$

Test cases:

Test ID	Word	Expected result	Obtained Result
1	00	Accept	Accepted
2	0110	Accept	Accepted
3	010010	Accept	Accepted
4	01	Reject	Rejected
5	001	Reject	Rejected
6	010	Reject	Rejected
7	0101	Reject	Rejected

Pushdown automata: Example\_2



```

C:\Users\Daniel\Documents\GitHub\pushdown_automata\PA\debug>PA.exe
### A single one transition is possible.
Going from state 0 to 1
The transition is: e , e -> $

Following the transition.
### More than one transition is possible. Possibilities:
Type 0 to choose: Origin: state 1 Destiny: state 1 -- Transition: 0 , e -> 0
Type 1 to choose: Origin: state 1 Destiny: state 2 -- Transition: e , e -> e
Which one must be chosen?
Enter an integer between 0 and 1
0
The number entered was: 0
Going from state 1 to 1
The selected transition is: 0 , e -> 0

### More than one transition is possible. Possibilities:
Type 0 to choose: Origin: state 1 Destiny: state 1 -- Transition: 0 , e -> 0
Type 1 to choose: Origin: state 1 Destiny: state 2 -- Transition: e , e -> e
Which one must be chosen?
Enter an integer between 0 and 1
1
The number entered was: 1
Going from state 1 to 2
The selected transition is: e , e -> e

### A single one transition is possible.
Going from state 2 to 2
The transition is: 0 , 0 -> e

Following the transition.
### A single one transition is possible.
Going from state 2 to 3
The transition is: e , $ -> e

Following the transition.
C:\Users\Daniel\Documents\GitHub\pushdown_automata\PA\debug>

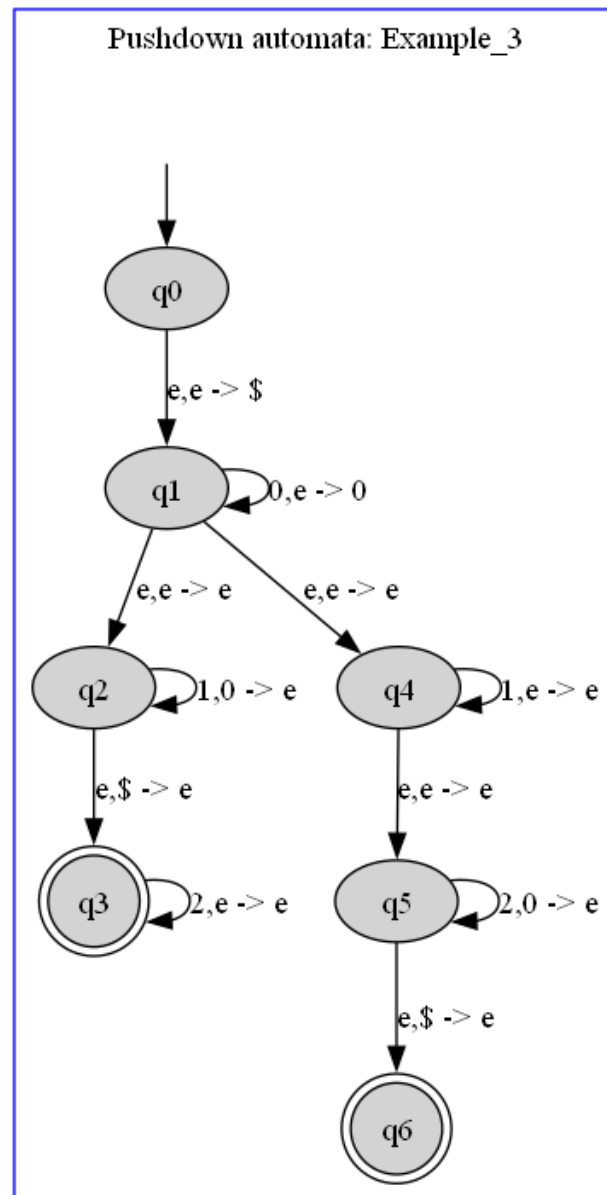
```

3) Language  $\{0^i1^j2^k \mid i=j \text{ ou } i=k \text{ com } n \geq 1\}$

Test cases:

Test ID	Word	Expected result	Obtained Result
1	012	Accept	Accepted
2	001122	Accept	Accepted
3	000111222	Accept	Accepted
4	01	Accept	Accepted
5	02	Accept	Accepted

6	0012	Reject	Reject
7	011222	Reject	Rejected

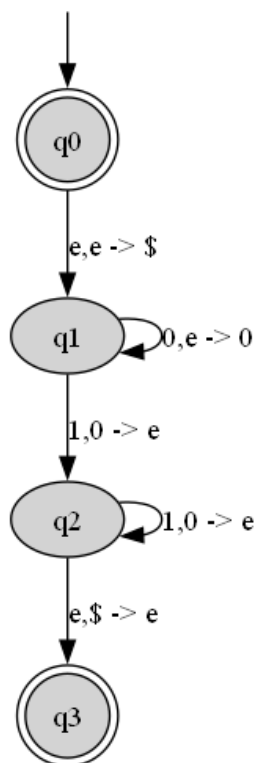


4) Language  $\{0^n 1^n \mid n \geq 0\}$ .

Test cases:

Test ID	Word	Expected result	Obtained Result
1	01	Accept	Accepted
2	0011	Accept	Accepted
3	000111	Accept	Accepted
4	0	Reject	Rejected
5	1	Reject	Rejected
6	001	Reject	Rejected
7		Accept	Accepted

Pushdown automata: Example\_4

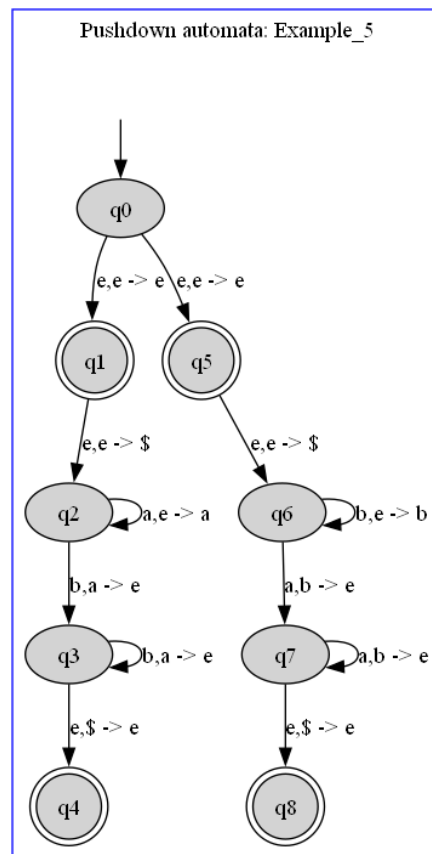




5) Language  $\{w \in \{a,b\}^* \mid w=a^n b^n \text{ ou } w=b^n a^n \text{ com } n \geq 0\}$

Test cases:

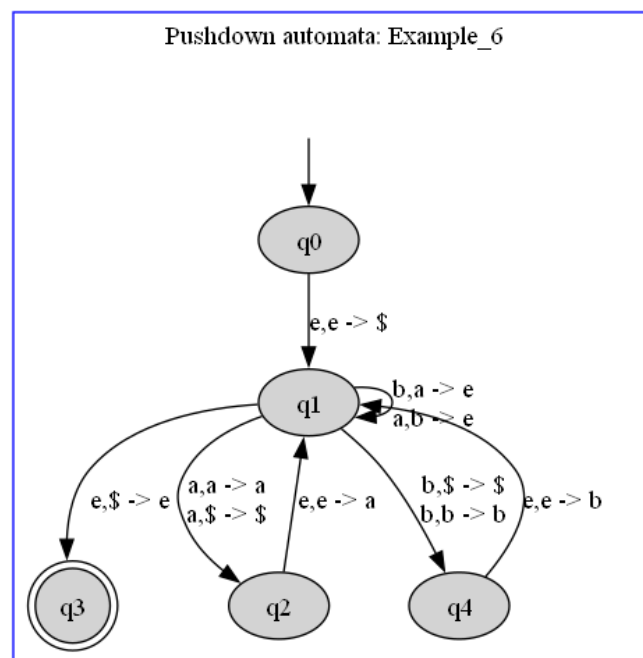
Test ID	Word	Expected result	Obtained Result
1		Accept	Accepted
2	ab	Accept	Accepted
3	ba	Accept	Accepted
4	aabb	Accept	Accepted
5	bbaa	Accept	Accepted
6	aab	Reject	Rejected
7	abaa	Reject	Rejected



6) Language  $\{w \in \{a,b\}^* \mid \text{the quantity of 'a' symbols is equal to the quantity of 'b' symbols}\}$

Test cases:

Test ID	Word	Expected result	Obtained Result
1		Accept	Accepted
2	ab	Accept	Accepted
3	ba	Accept	Accepted
4	aabb	Accept	Accepted
5	bbaa	Accept	Accepted
6	aab	Reject	Rejected
7	abaa	Reject	Rejected



7) Language  $L = \{a^n b^m a^{n+m} | n \geq 0, m \geq 0\}$

Test cases:

Test ID	Word	Expected result	Obtained Result
1		Accept	Accepted
2	abaa	Accept	Accepted
3	aabbaaaa	Accept	Accepted
4	ab	Reject	Rejected
5	aba	Reject	Rejected
6	ba	Accept	Accepted
7	baa	Reject	Rejected

Pushdown automata: Example\_7

