# Week 3

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# Week 3 作业

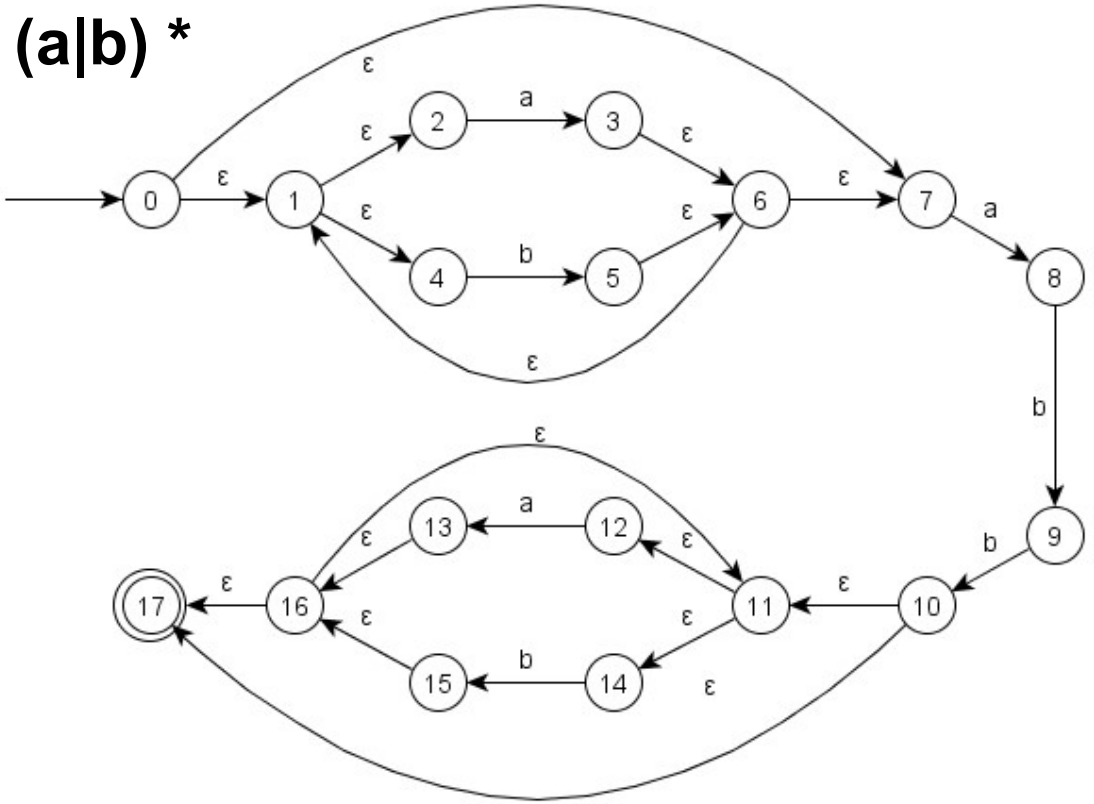
- 教材P105：3.7.3(4)， 教材P109：3.8.1
- 教材P118：3.9.3 (用算法3.36构造)，3.9.4

## Week 3 作业

- **教材P105 3.7.3(4)：Convert the following regular expressions to deterministic finite automata, using algorithms 3.23 and 3.20**
  - 4) (a|b) * abb (a|b) *

# Week 3 作业

- **(a|b) * abb (a|b) ***
  - NFA



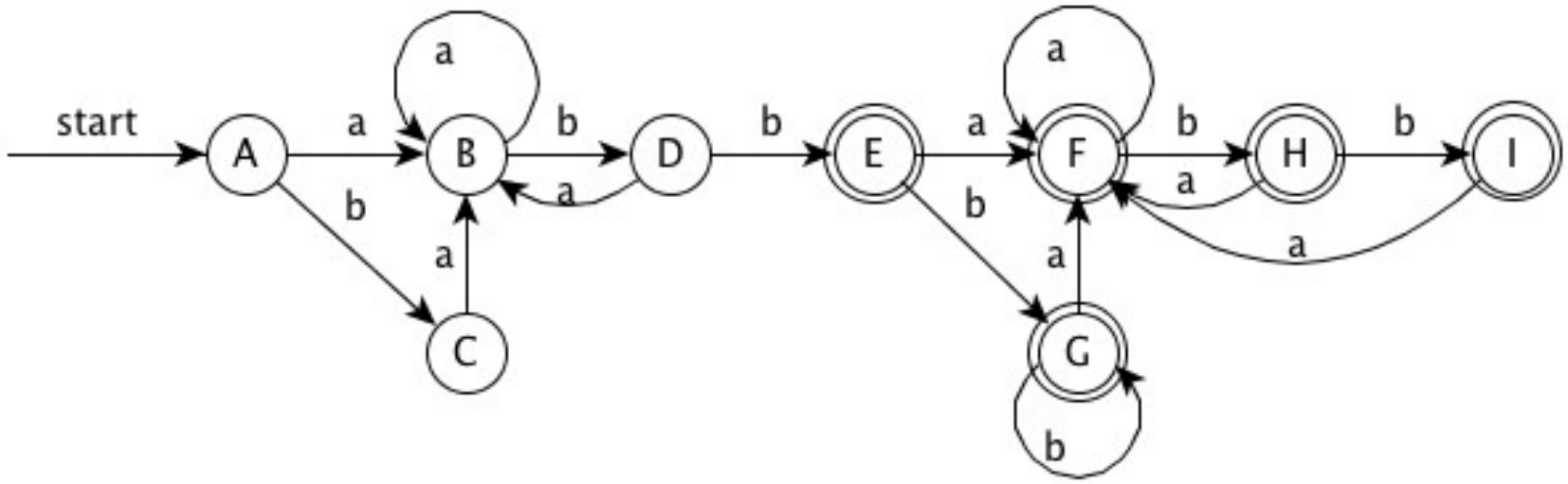
# Week 3 作业

- **(a|b) * abb (a|b) ***
  - Transition table

| NFA State | DFA State | a | b |
|---|---|---|---|
| {0,1,2,4,7} | A | B | C |
| {1,2,3,4,6,7,8} | B | B | D |
| {1,2,4,5,6,7} | C | B | C |
| {1,2,4,5,6,7,9} | D | B | E |
| {1,2,4,5,6,7,10,11,12,14,17} | E | F | G |
| {1,2,3,4,6,7,8,11,12,13,14,16,17} | F | F | H |
| {1,2,4,5,6,7,11,12,13,15,16,17} | G | F | G |
| {1,2,4,5,6,7,9,11,12,14,15,16,17} | H | F | I |
| {1,2,4,5,6,7,10,11,12,14,15,16,17} | I | F | G |

# Week 3 作业

- **(a|b) * abb (a|b) ***
  - DFA

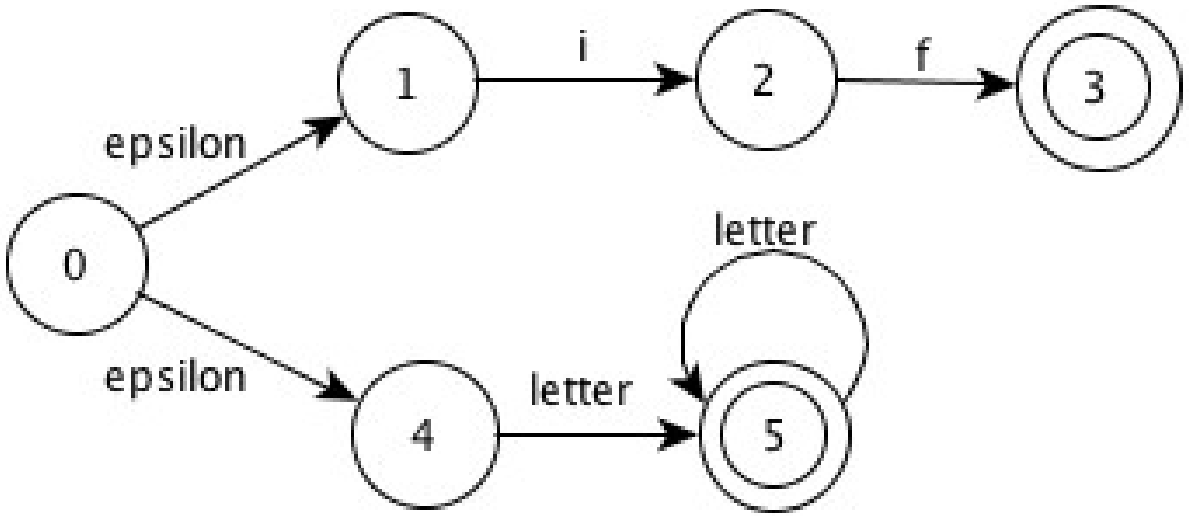


## Week 3 作业

- **教材P109 3.8.1：Suppose we have two tokens: (1) the keyword if , and (2) identifiers, which are strings of letters other than i f . Show:**
  - a) The NFA for these tokens, and
  - b) The DFA for these tokens.

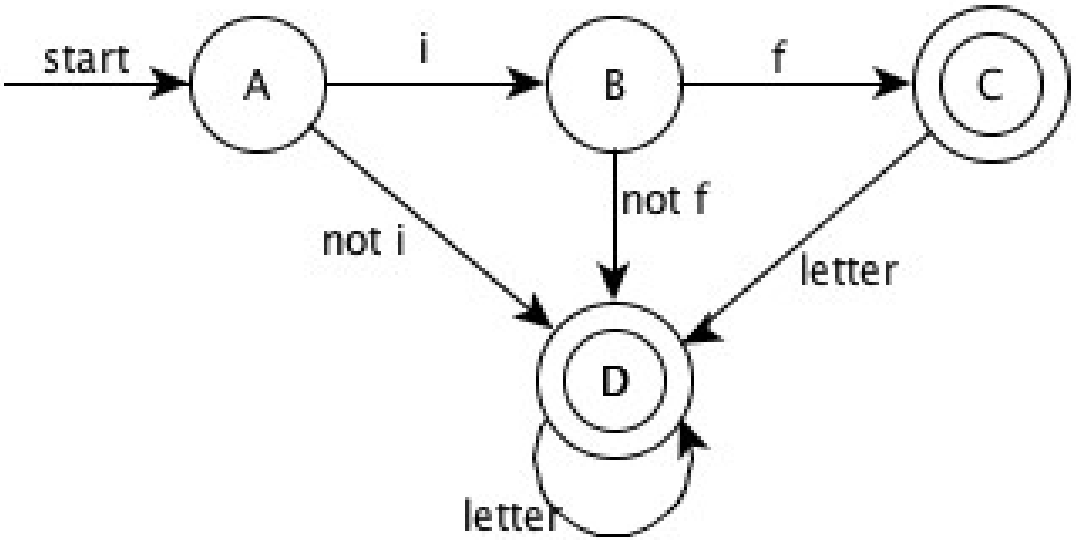
# Week 3 作业

- **The NFA for these tokens.**
  - NOTE: this NFA has potential conflict, we can decide the matched lexeme by 1. take the longest 2. take the first listed.



# Week 3 作业

- **The DFA for these tokens.**

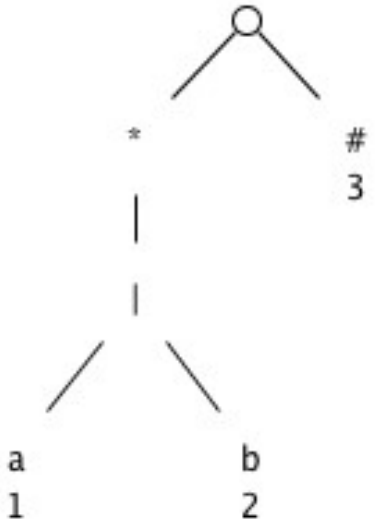


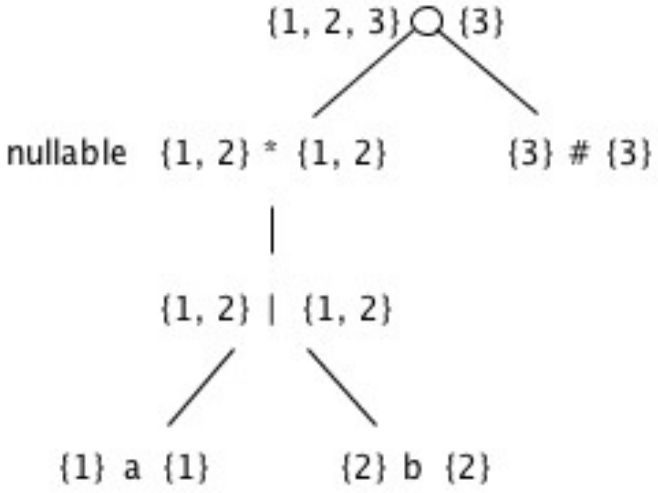
## Week 3 作业

- **教材P118 3.9.3：**We can prove that two regular expressions are equivalent by showing that their minimum-state DFA's are the same up to renaming of states.Show in this way that the following regular expressions: **(a|b)***, **(a*|b*)***, and **((ε|a)b*)*** are all equivalent. (**Algorithm 3.36**)

# Week 3 作业

- **(a|b)***
  - Syntax tree

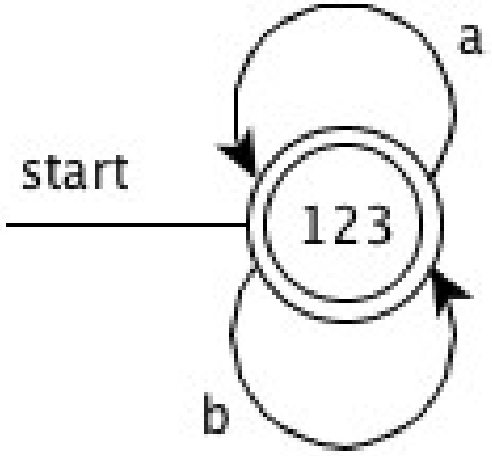


# Week 3 作业

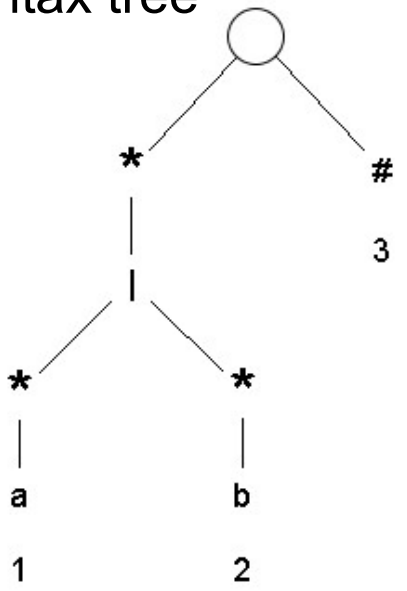
- **(a|b)***

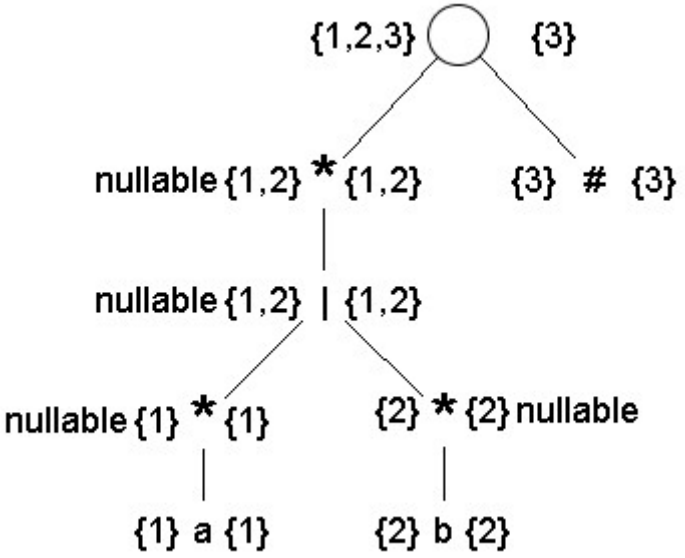
| node n | followpos(n) |
|---|---|
| 1 | {1, 2, 3} |
| 2 | {1, 2, 3} |
| 3 | ∅ |



# Week 3 作业

- **(a* |b* )***
  - Syntax tree

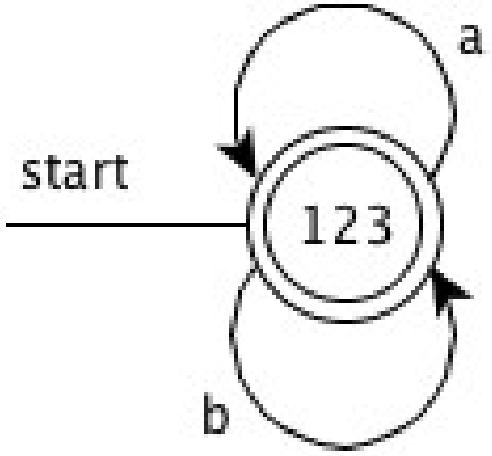


# Week 3 作业

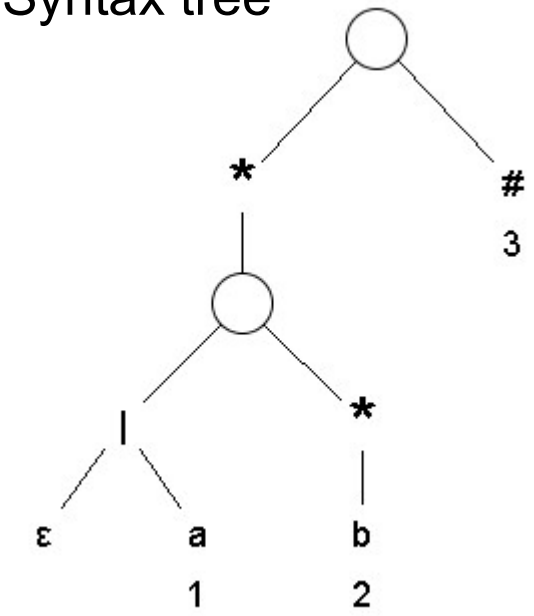
- **(a* |b* )***

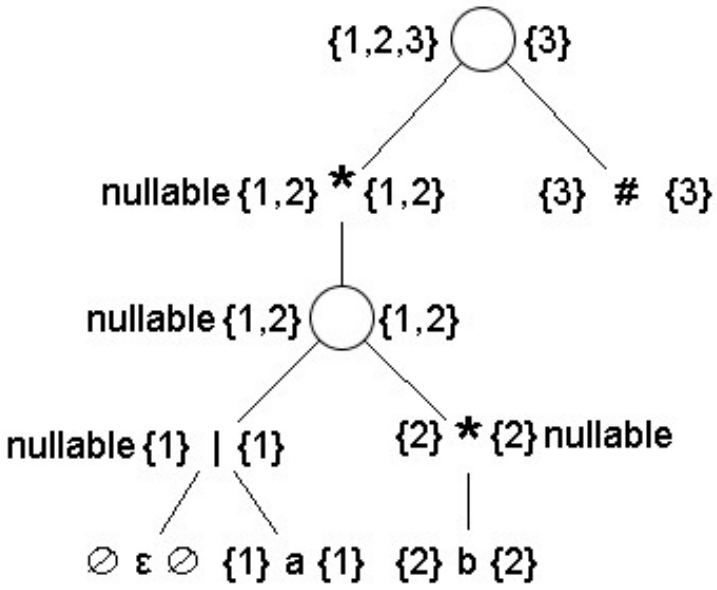
| node n | followpos(n) |
|---|---|
| 1 | {1, 2, 3} |
| 2 | {1, 2, 3} |
| 3 | ∅ |



# Week 3 作业

- **((ε |a)b* ) ***
  - Syntax tree

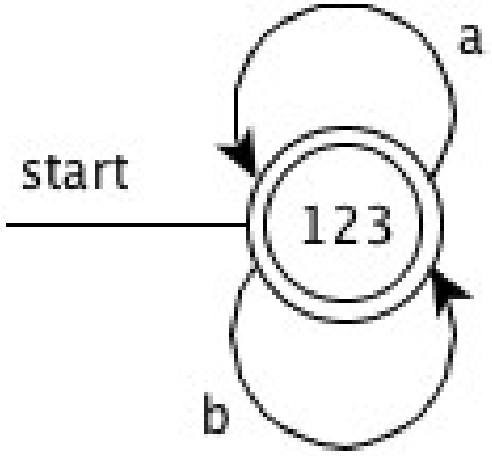


# Week 3 作业

- **((ε |a)b* ) ***

| node n | followpos(n) |
|---|---|
| 1 | {1, 2, 3} |
| 2 | {1, 2, 3} |
| 3 | ∅ |



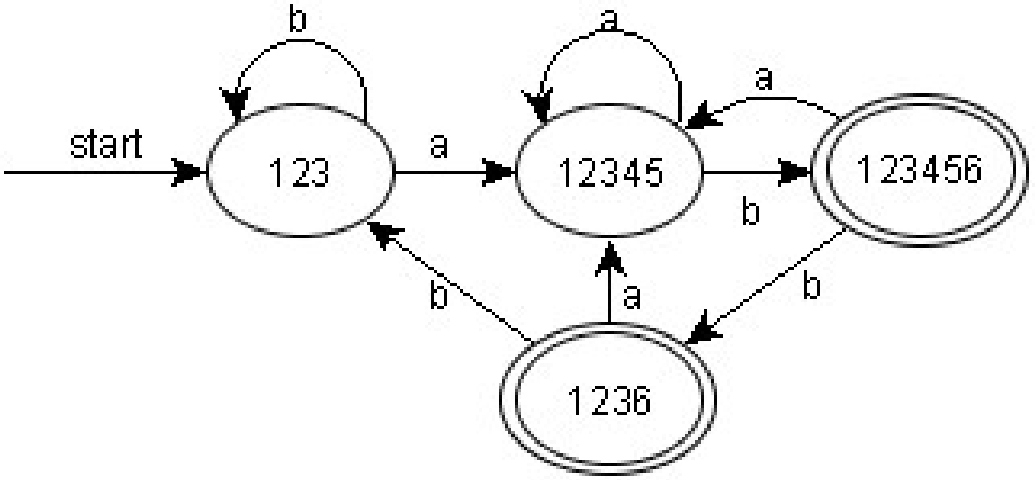
## Week 3 作业

- **教材P109 3.8.1：**Construct the minimum-state DFA's for the following regular expressions:
  - 1. (a|b)*a(a|b)
  - 2. (a|b)*a(a|b)(a|b)
  - 3. (a|b)*a(a|b)(a|b)(a|b)

  Do you see a pattern?

# Week 3 作业

- **(a|b)*a(a|b)**
  - 4个状态



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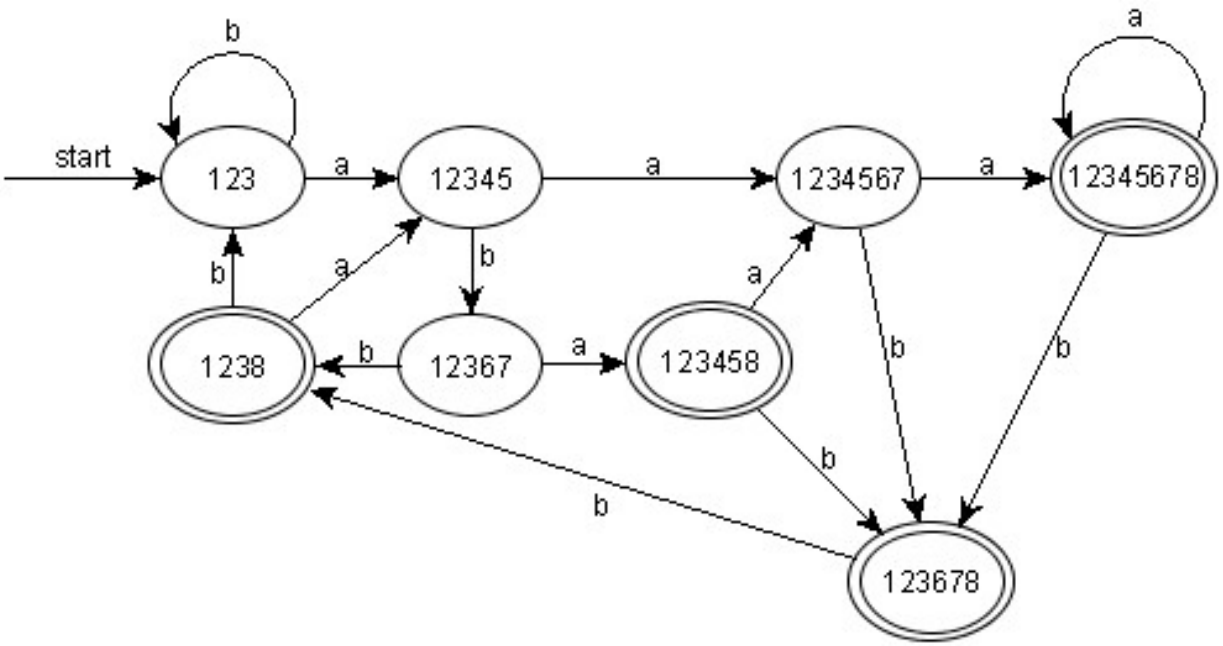
- **(a|b)*a(a|b)(a|b)**
  - 8个状态



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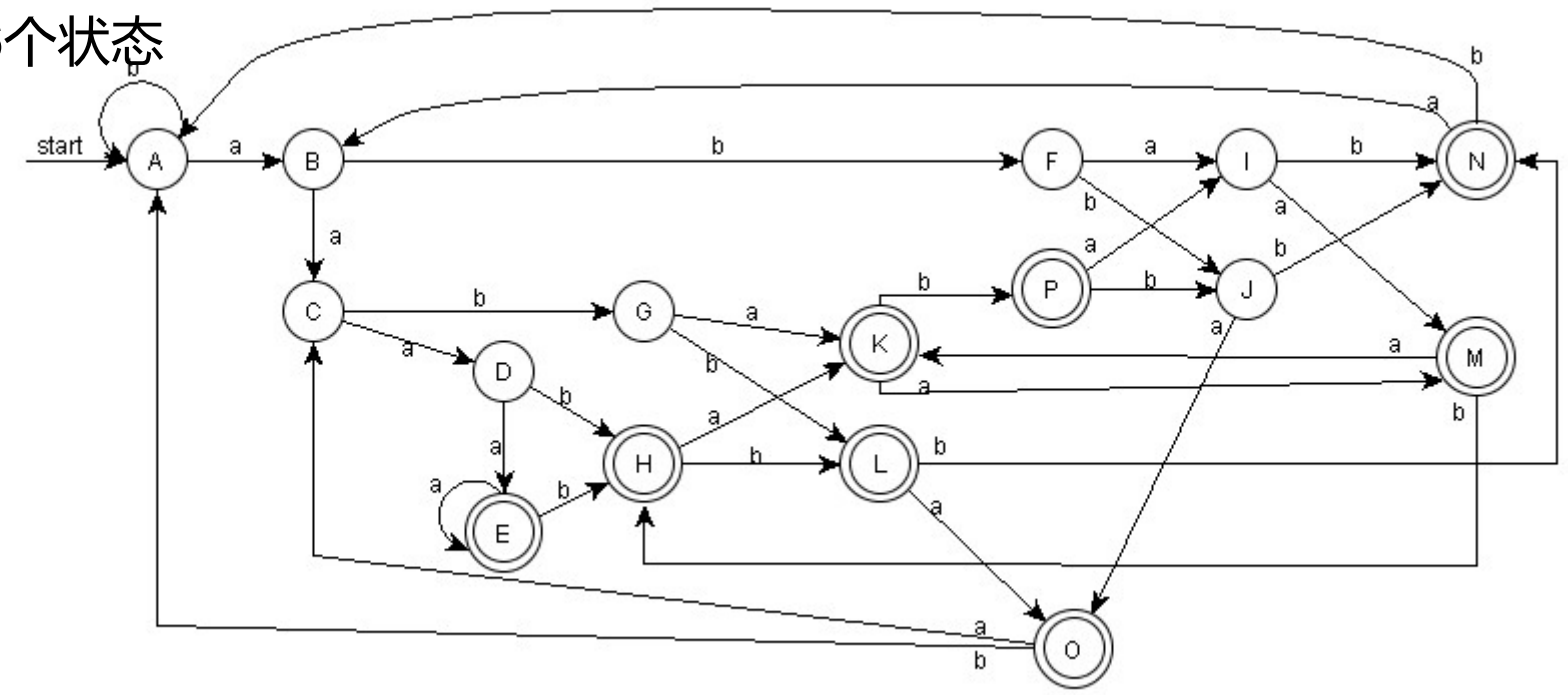
- **(a|b)*a(a|b)(a|b)(a|b)**
  - 16个状态



# Thank you!