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KLEENE'S THEOREM

KLEENE's THEOREM

วัตถุประสงค์

UNIFICATION

Kleene's theorem, 1956

All three methods of defining languages
regular expression,
acceptance by finite automata and
acceptance by transition graph
are equivalent

KLEENE's THEOREM

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It is clear that a finite automaton is a transition graph.

UNIFICATION

Kleene's theorem, 1956

- Language accepted by a finite automaton can be defined by a transition graph.
- Language accepted by a transition graph can be defined by a regular expression.
- Language generated by a regular expression can be defined by a finite automaton.

KLEENE's THEOREM

UNIFICATION

Kleene's theorem, 1956

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Proof:
Given a transition graph TG.
Find a regular expression that defines the same language.

Construct an algorithm that satisfies two criteria.

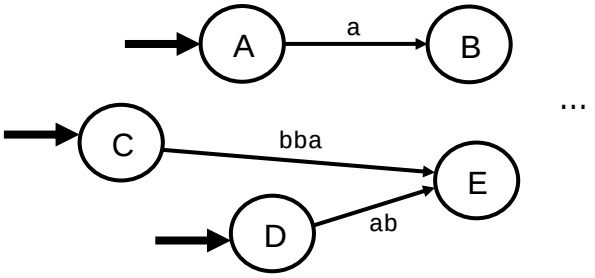
- Work for every conceivable transition graph
- Guarantee to finish its job in a finite time.

KLEENE's THEOREM

UNIFICATION

Kleene's theorem, 1956

STATEGY
Only one initial state.



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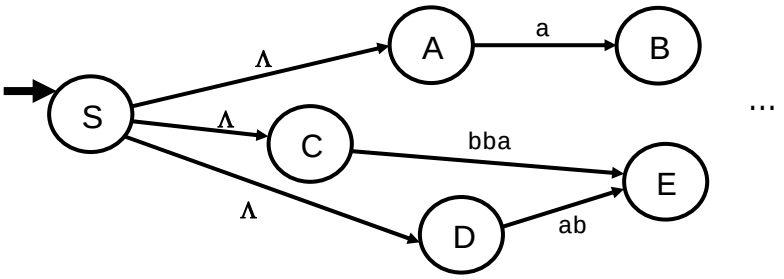

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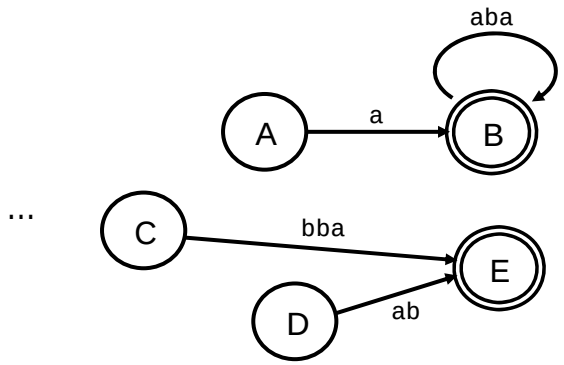
Kleene's theorem, 1956

STATEGY
Only one final state.



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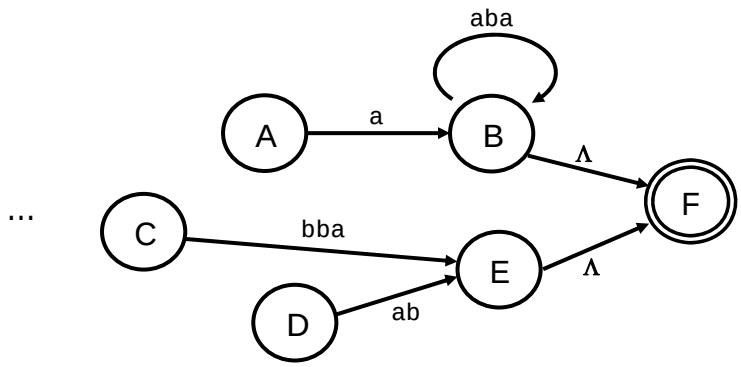

KLEENE's THEOREM

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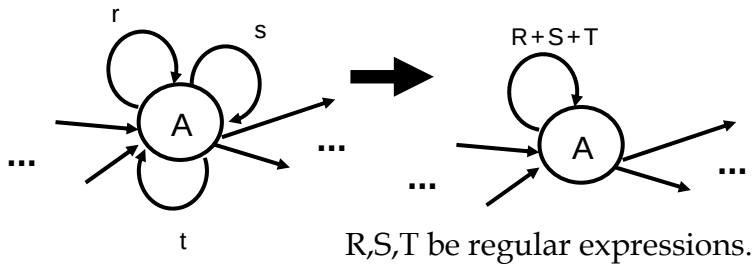
Kleene's theorem, 1956

STATEGY
Eliminate all internal states.

Let A be any state in a transition graph.
r, s and t be any substrings.



R,S,T be regular expressions.

KLEENE's THEOREM

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Let A,B be states in a transition graph.
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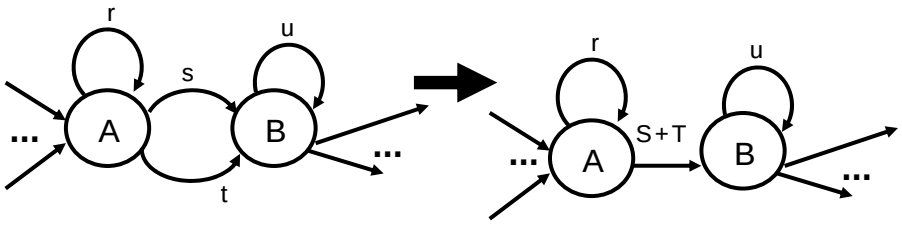

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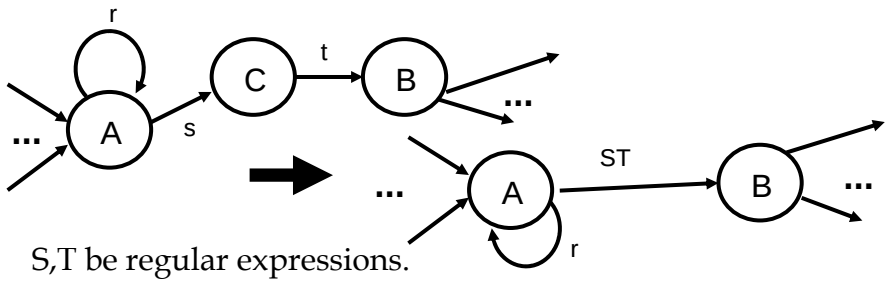

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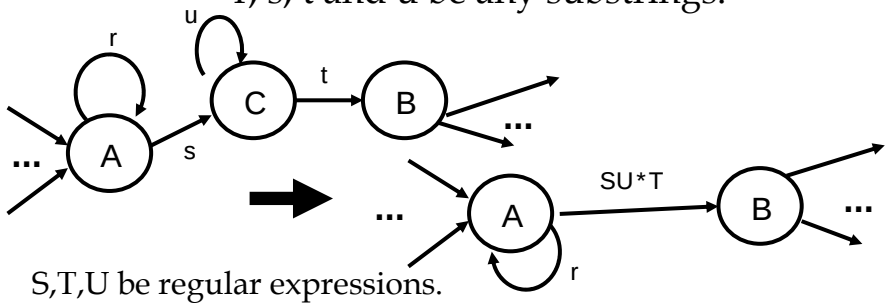

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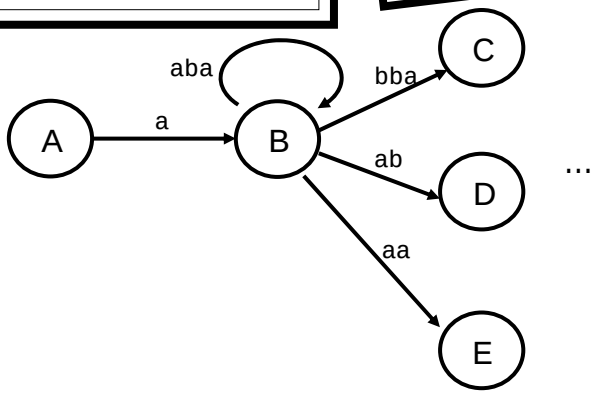

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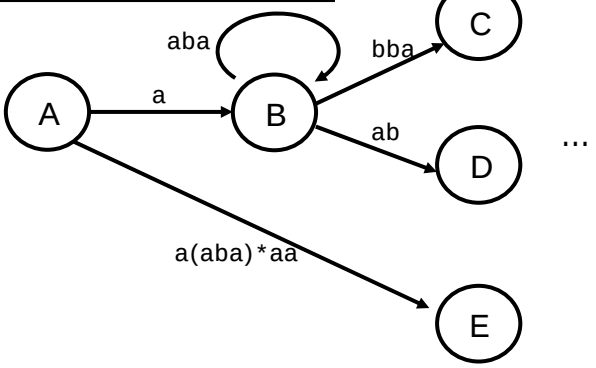

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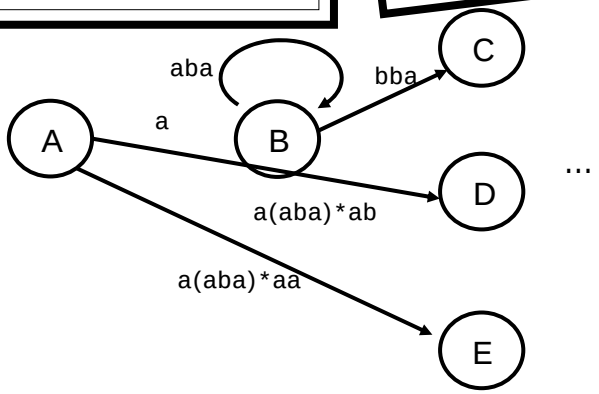

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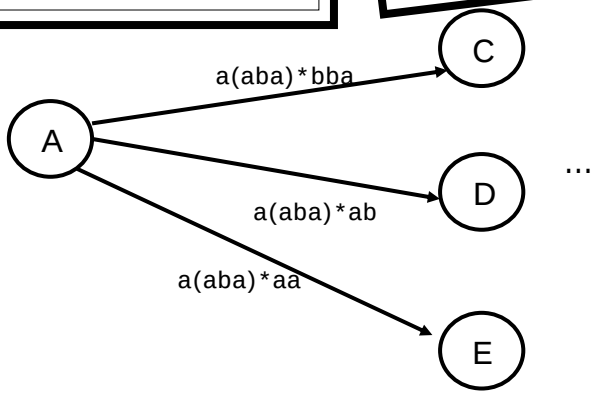

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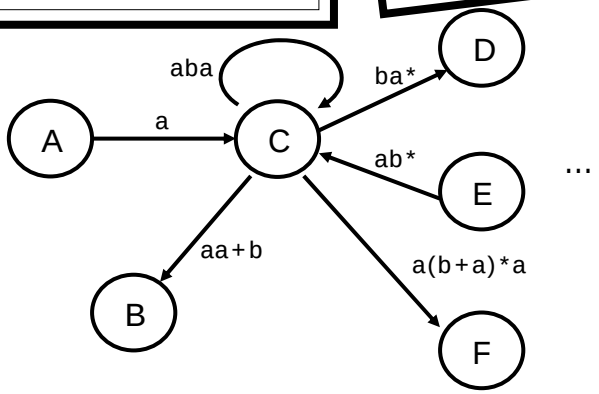

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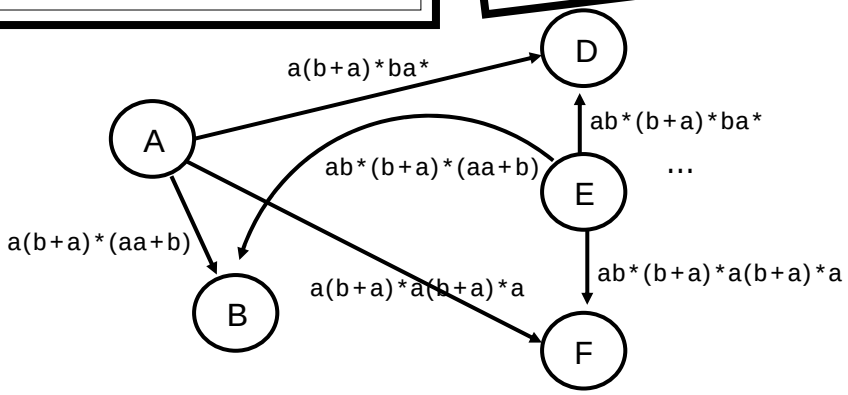

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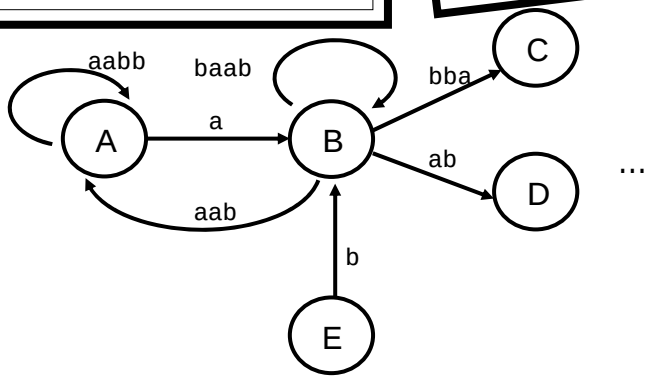

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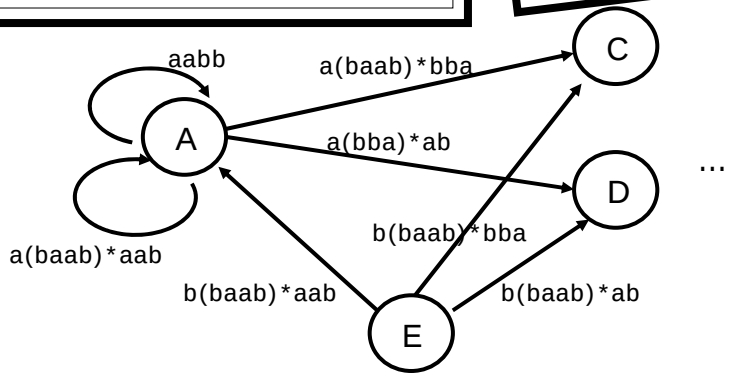

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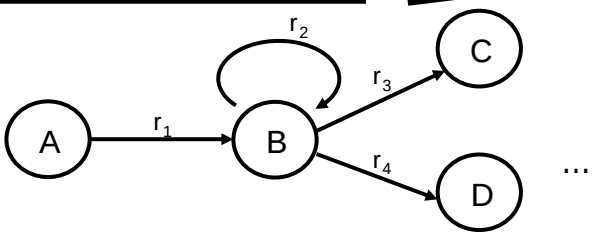
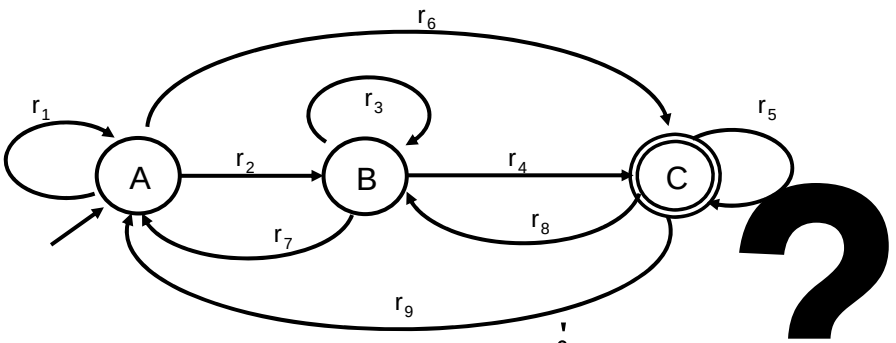


Eliminate B, by create AC = $r_1r_2^*r_3$
create AD = $r_1r_2^*r_4$
delete AB
erase B when B has no input.

โจทย์ น่าคิด



จงหาการบรรยายสม่ำเสมอ ...

regular expression

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Proof:
Given a regular expression.
Find an automaton that defines the same language.

Construct an algorithm that satisfies two criteria.

- Accepts any particular letter of the alphabet. (or Λ)
- Close under +, concatenation and Kleene's star.

KLEENE's THEOREM

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Kleene's theorem, 1956

ทฤษฎีบท

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Let FA_1 accepts the language defined by regular expression r_1,
FA_2 accepts the language defined by regular expression r_2.
Then there is a FA_3 accepts the language (r_1+r_2).

Then there is a FA_4 accepts the language r_1r_2.

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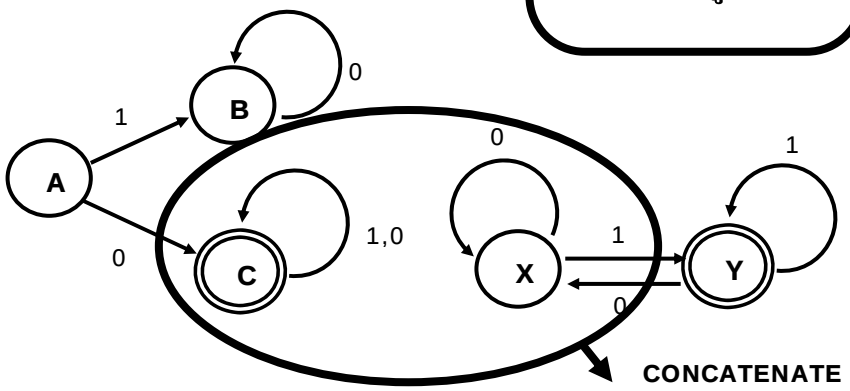

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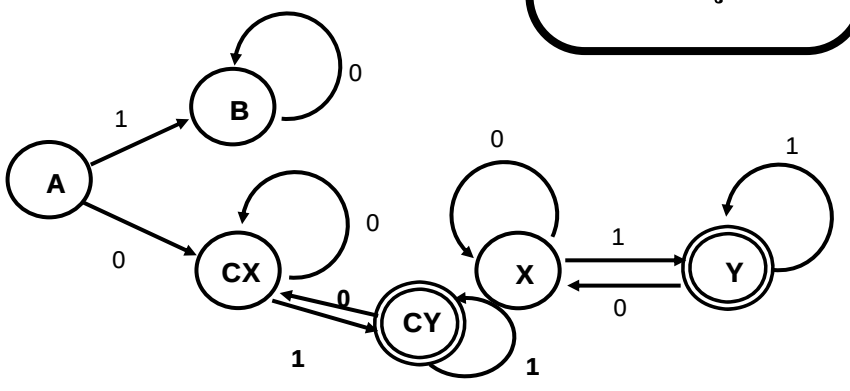

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Then there is a FA_4 accepts the language r_1r_2.

Then there is a FA_5 accepts the language r_1^*.