Regular Grammars

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1 Regular Grammars

In this exercise we study an example of a regular grammar. A *right linear* grammar is one in which each production is of one of the following forms
$X \to wY$
$X \to w$
where X and Y are variables and w is a string of terminals. Can you similarly define a left linear grammar? A *regular grammar* is one that is either left linear or right linear. You may know that a regular grammar generates a regular language, that is, one that can also be generated by a DFA, an NFA, or a regular expression.

We study the following regular grammar:
$S \to abS$
$S \to a$

What words can this right linear grammar derive? Clearly the string a is derivable from the second production. The first production, when recursively applied, derives words of the form $S \to abS \to ababS \to \cdots \to ababab \cdots abS \to ababab \cdots aba$ where the second production is applied at the end. Hence, it appears that the language of this grammar is $L = \{(ab)^n a : n \geq 0\}$.

2 Problems for practice

(a) Show that the language of this grammar is as above.

(b) Use JFLAP to convert this regular grammar to a DFA with two states that accepts the language L.

3 References

1. JFLAP - An Interactive Formal Languages and Automata Package, Susan H. Rodger and Thomas W Finley. Jones and Bartlett Publishers. 2006