Example: Context Free Grammar$_{JP}$

Enter a context-free grammar that generates the following language L over the alphabet Σ = {a, b}:

L = { *w* | *w* contains at least two **a** symbols }

Sample Solution (see `CFG_xaxax.jff`)

Consider that the only constraint is two appearances of the symbol **a** and that any number of symbols may appear before and between them.

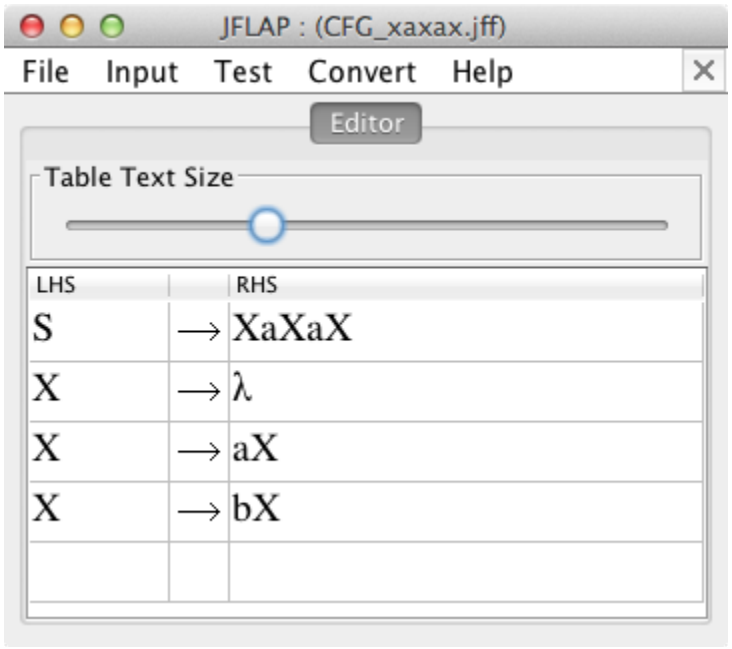
This suggests that the start symbol produce the required number of **a** symbols surrounded and separated by arbitrary strings.

$$S \rightarrow XaXaX$$

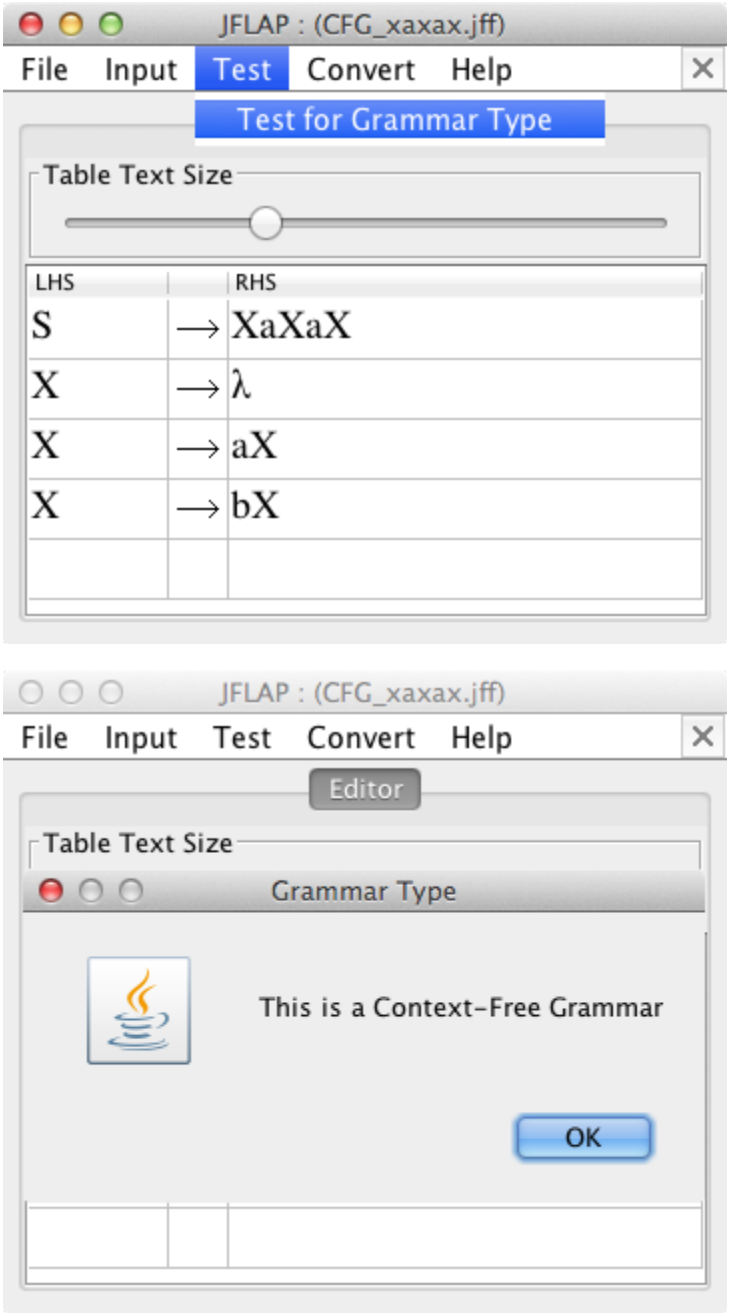
The remaining rules combine to produce all strings over {a, b}*.

$$X \rightarrow \varepsilon \mid aX \mid bX$$

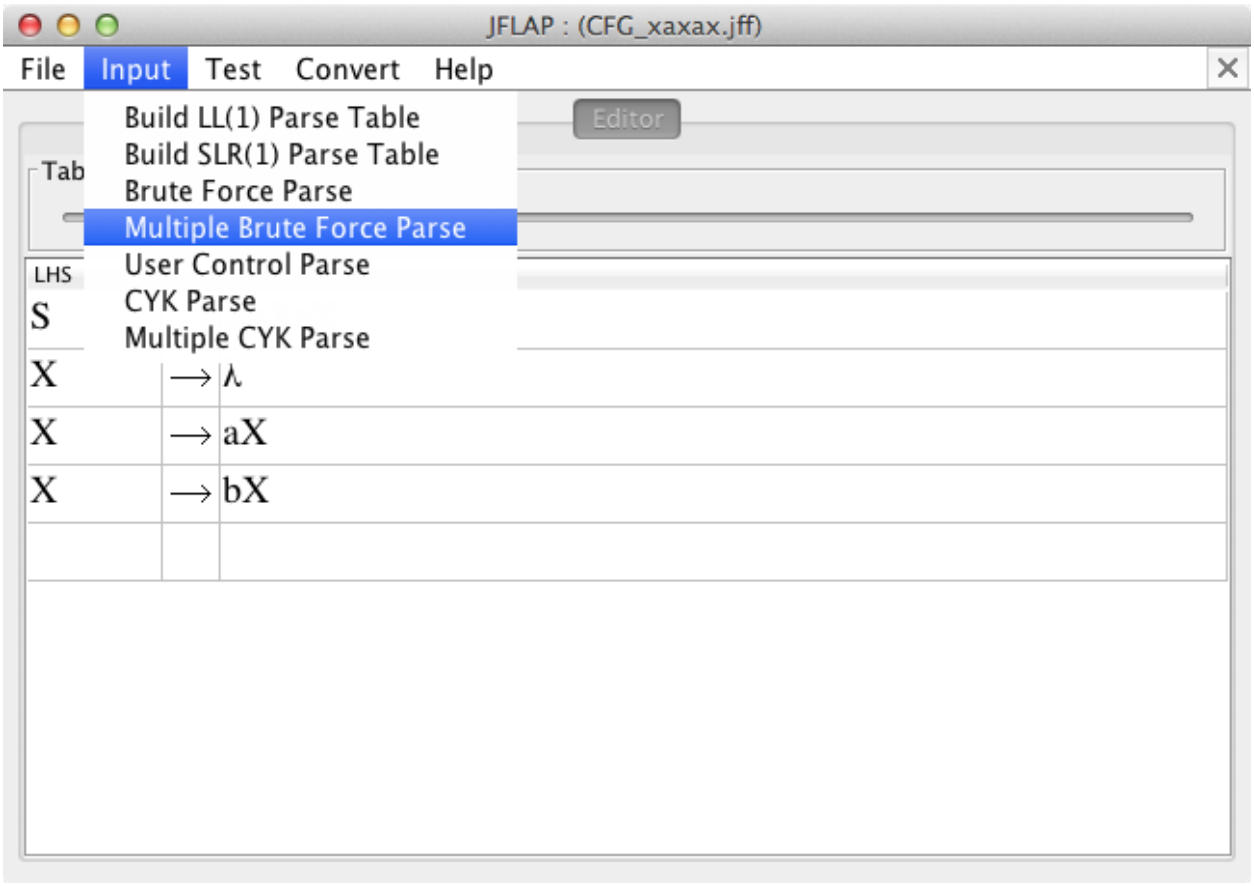
1. Enter this grammar into JFLAP.

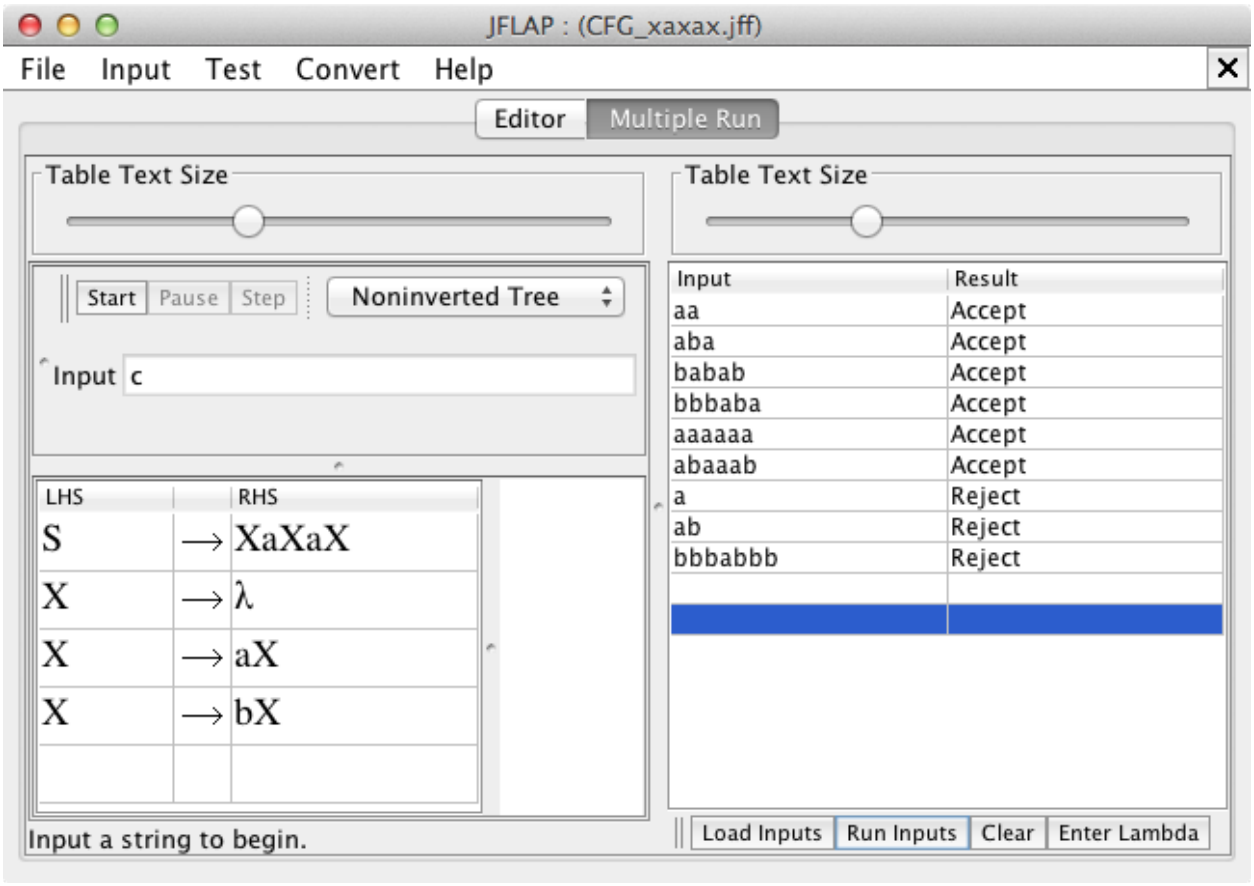


2. Check the type of grammar using *Test* > *Test for Grammar Type.*

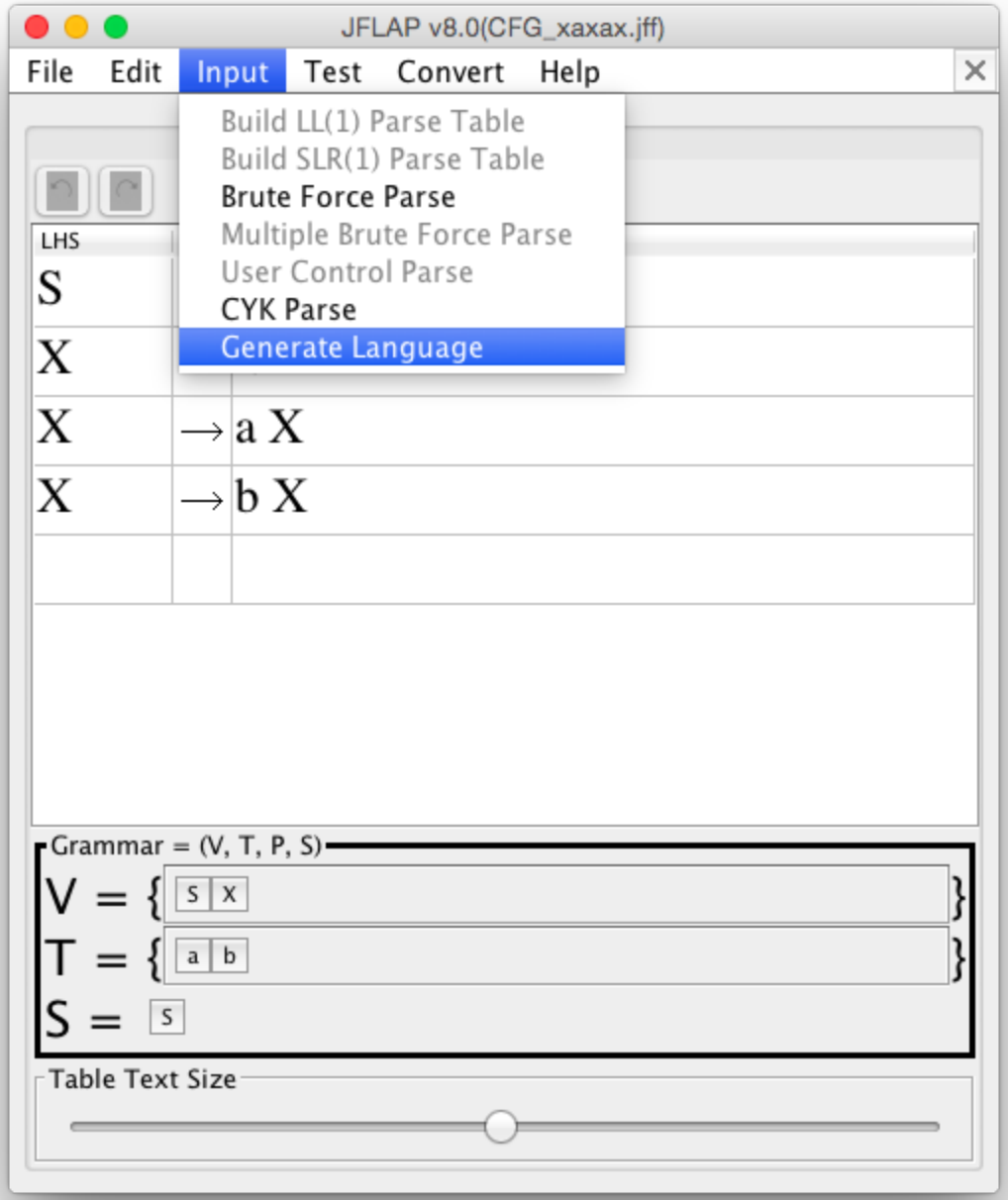


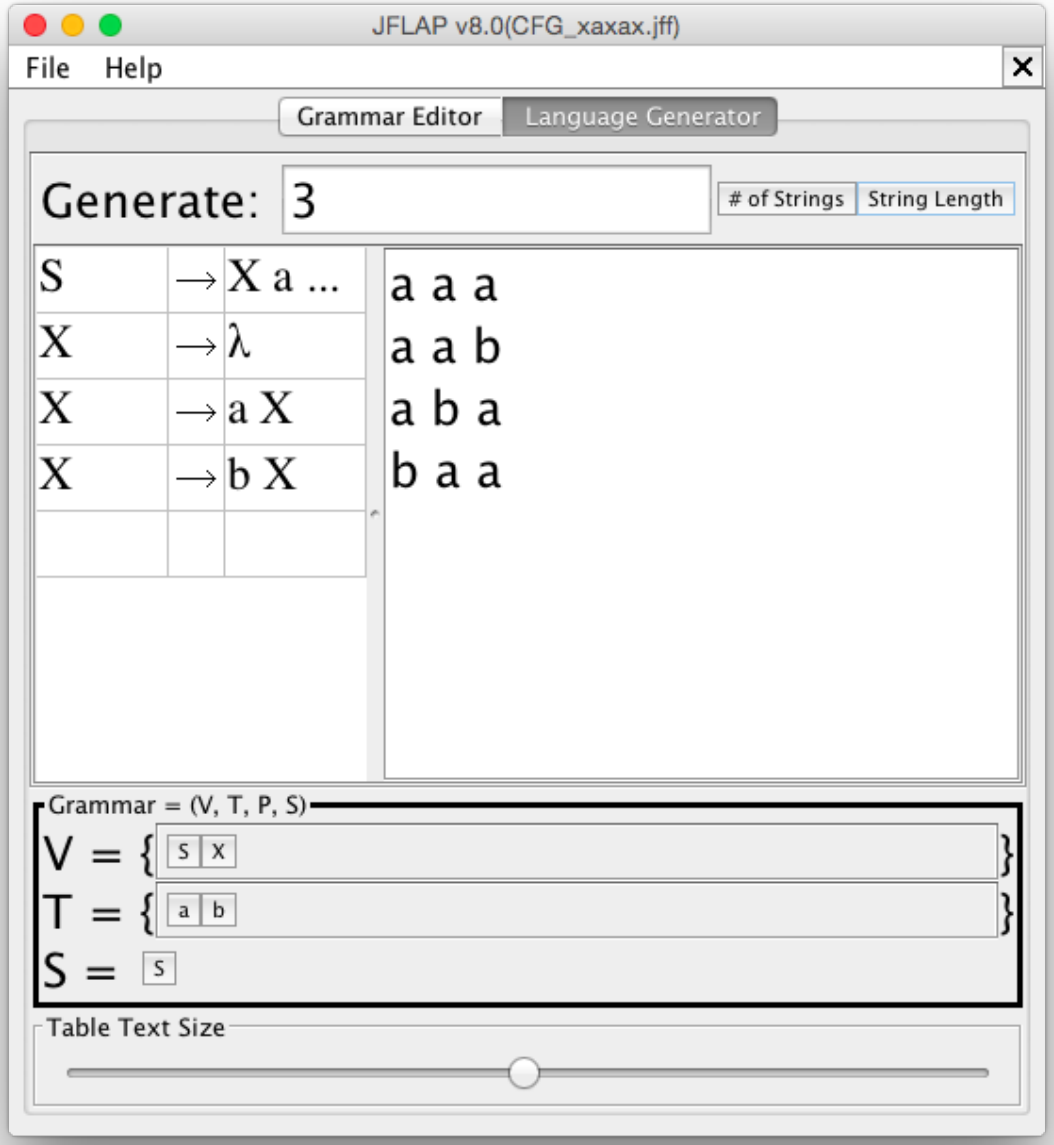
3. Verify known strings using *Input* > *Multiple Brute Force Parse.*


JFLAP : (CFG_xaxax.jff)
File
Input
Test
Convert
Help
Build LL(1) Parse Table
Build SLR(1) Parse Table
Brute Force Parse
Multiple Brute Force Parse
User Control Parse
CYK Parse
Multiple CYK Parse
Editor
Tab
LHS
S
X → λ
X → aX
X → bX



Now use the Generate Language feature of JFLAP (8 or higher) to produce all strings of length 3.


JFLAP v8.0(CFG_xaxax.jff)
File
Edit
Input
Test
Convert
Help
Build LL(1) Parse Table
Build SLR(1) Parse Table
Brute Force Parse
Multiple Brute Force Parse
User Control Parse
CYK Parse
Generate Language
LHS
S
X
X → a X
X → b X
Grammar = (V, T, P, S)
V = { S X }
T = { a b }
S = S
Table Text Size


JFLAP v8.0(CFG_xaxax.jff)
File
Help
Grammar Editor
Language Generator
Generate:
3
# of Strings
String Length
S → X a ...
X → λ
X → a X
X → b X
a a a
a a b
a b a
b a a
Grammar = (V, T, P, S)
V = { S X }
T = { a b }
S = S
Table Text Size