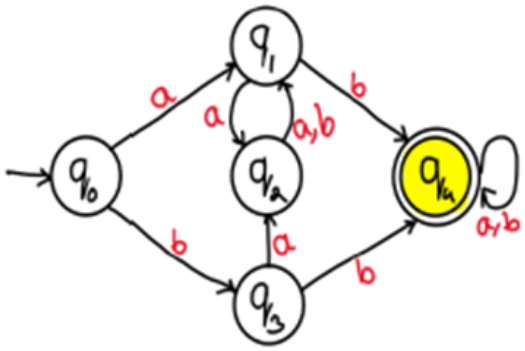
PROBLEM STATEMENT 9:

Demonstrate the usage of JFLAP tool for the minimization of the given DFA.

DFA:



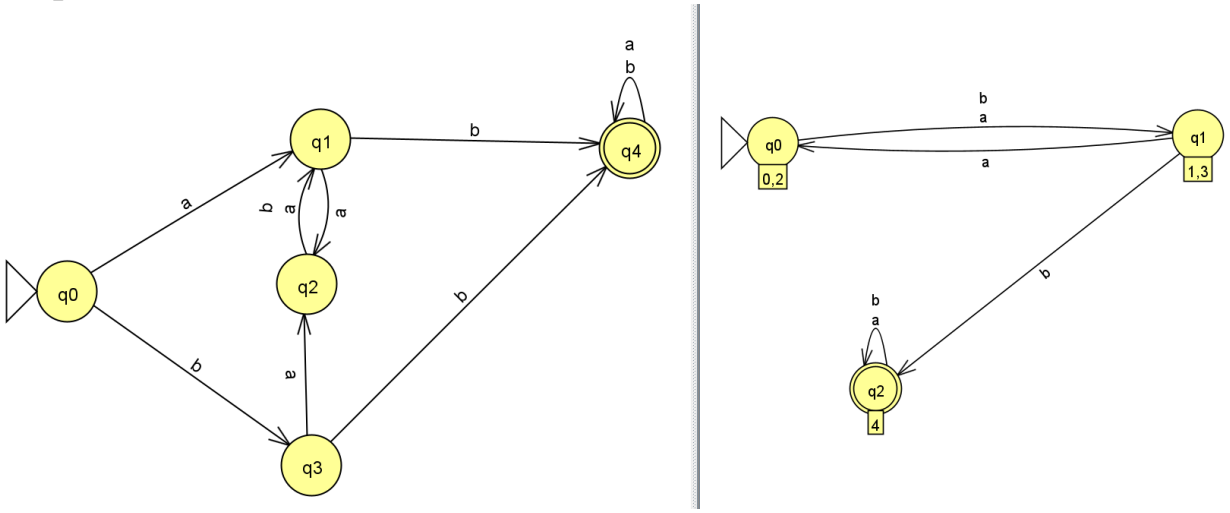
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to design and minimization of the given DFA.

Steps:

Step 1: Calculate the K-equivalent sets of the given DFA
Step 2: Open JFLAP, Click on "File" > "New" > "Finite Automaton."
Step 3: In the JFLAP interface, we have a blank canvas.
Step 4: We will design the given DFA on the canvas.
Step 5: Select "Convert" from the menu at the top and choose " Minimize DFA."
Step 6: JFLAP will display the minimized DFA to inspect. It will show the equivalent DFA with fewer states.

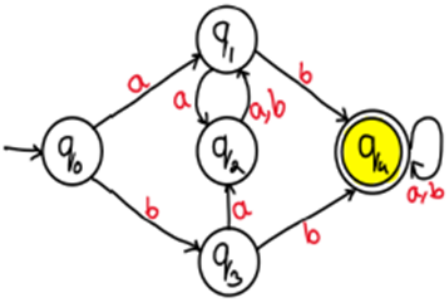
Output:



Problem Statement 10:

Demonstrate the usage of JFLAP tool to design and convert the following DFA to its grammar

DFA:



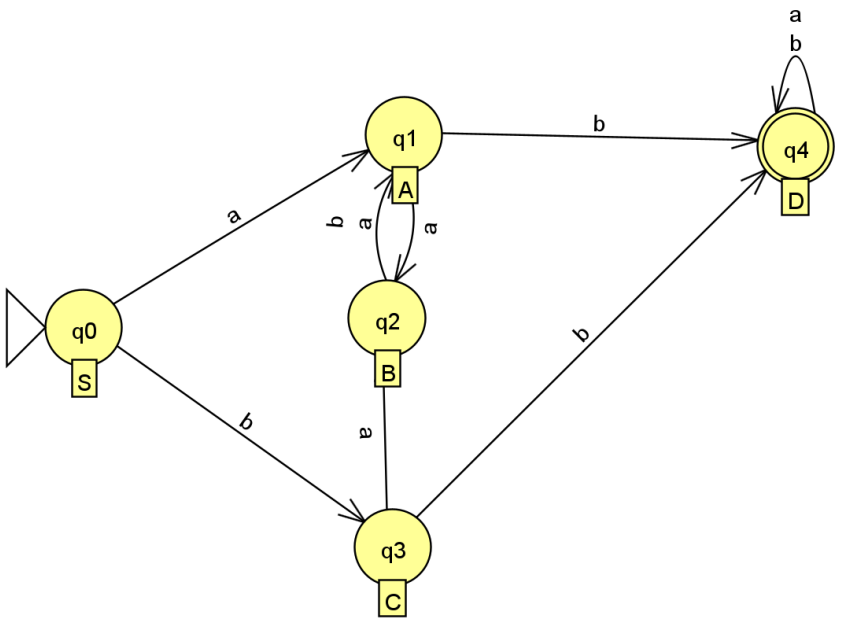
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to design and conversion of the given DFA into its grammar.

Steps:

Step 1: Launch the JFLAP tool on your computer.
Step 2: Create a New Project. Click on "File" > "New" > "Automaton" to initiate a new project. Select "DFA" as the automaton type.
Step 3: Import DFA. If the DFA diagram is already given, you can import it into JFLAP. Go to "File" > "Import" and select the file containing the DFA.
Step 4: Simulate the DFA within JFLAP to verify its correct functionality. Test its acceptance and rejection patterns using various input strings.
Step 5: Convert to Grammar. Navigate to the relevant tool or menu in JFLAP that facilitates the conversion of DFA to grammar. Follow the prompts or options to execute the conversion.
Step 6: Review Grammar Representation. Examine the generated grammar representation corresponding to the given DFA. Understand the grammar rules and symbols that capture the language recognized by the DFA.

Output:

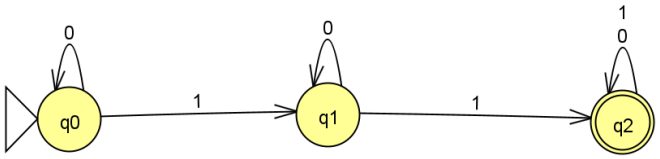


LHS		RHS
C	→	bD
D	→	aD
D	→	bD
A	→	bD
S	→	aA
S	→	bC
B	→	bA
C	→	aB
B	→	aA
A	→	aB
D	→	λ

Problem Statement 11:

Demonstrate the usages of JFLAP tool to design and generate regular expression the following Deterministic Finite Automata (DFA).

DFA:



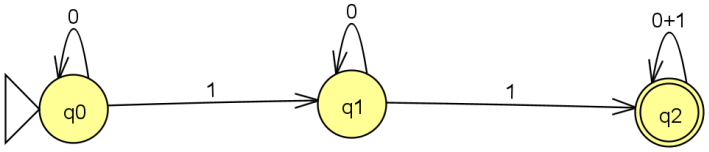
DESCRIPTION OF THE PROBLEM STATEMENT:

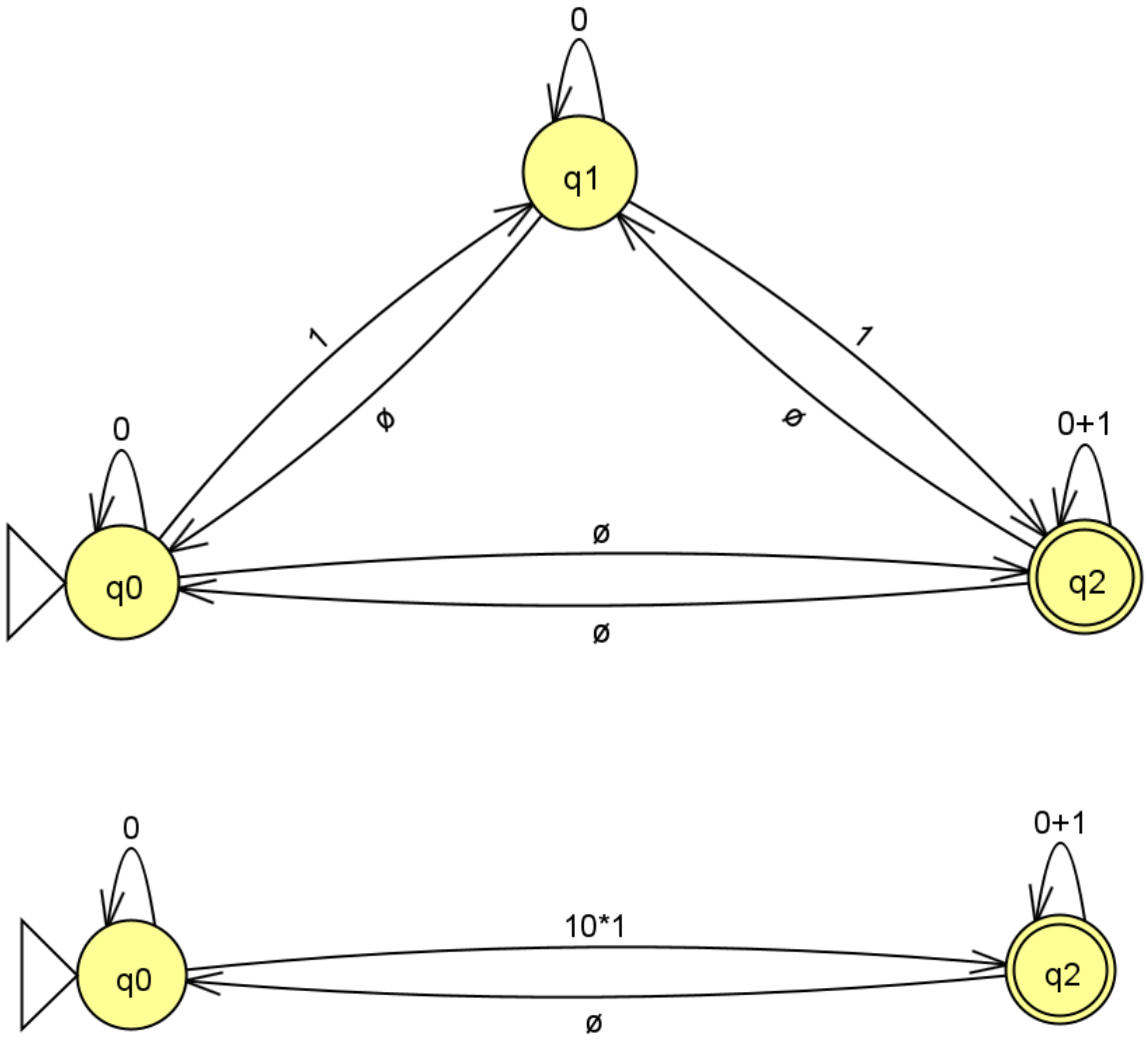
JFLAP, a popular tool in formal languages and automata theory, allows users to visually design and manipulate finite automata, including DFAs. In this scenario, we leverage JFLAP to design a DFA and then generate a regular expression that represents the language recognized by the DFA.

STEPS:

Step 1: Open JFLAP on your computer.
Step 2: Click on "File" in the menu and select "New" and then "Automaton" to create a new automaton.
Step 3:Define states for the DFA by clicking on the "State" tool and creating states on the canvas.
Define the alphabet using the "Input" tool to enter symbols.
Step 4:Use the "Transition" tool to define transitions between states based on the DFA's transition function. Specify transition labels by indicating the input symbols for each transition.
Step 5: Mark Initial and Final States. Mark the initial state with the "Initial State" tool. Identify final states using the "Final State" tool.
Step 6: Test the DFA. Use the "Input" tool to enter strings and test the DFA. Observe whether the strings are accepted or rejected.
Step 7: Click on "Convert" in the menu, then select "Convert to Regular Grammar."
Follow the prompts to generate a regular grammar for the DFA.
Step 8: Examine the generated regular expression.
Manually refine the regular expression if necessary for simplicity or specific requirements.

OUTPUT





Generalized Transition Graph Finished!
0*10*1(0+1)*

Problem Statement 12:

Demonstrate the usage of JFLAP tool to design and convert the DFA to equivalent Right-Linear Grammar for the following Language:
L={aw |w € ∑={a,b}

Description of the problem statement:

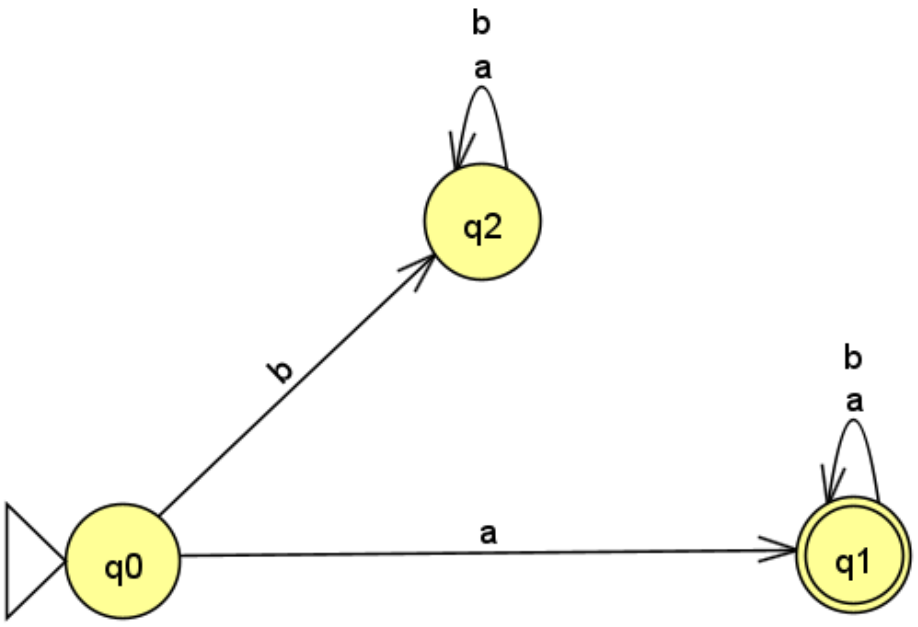
JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to design DFA and convert the DFA to equivalent Right-Linear Grammar.

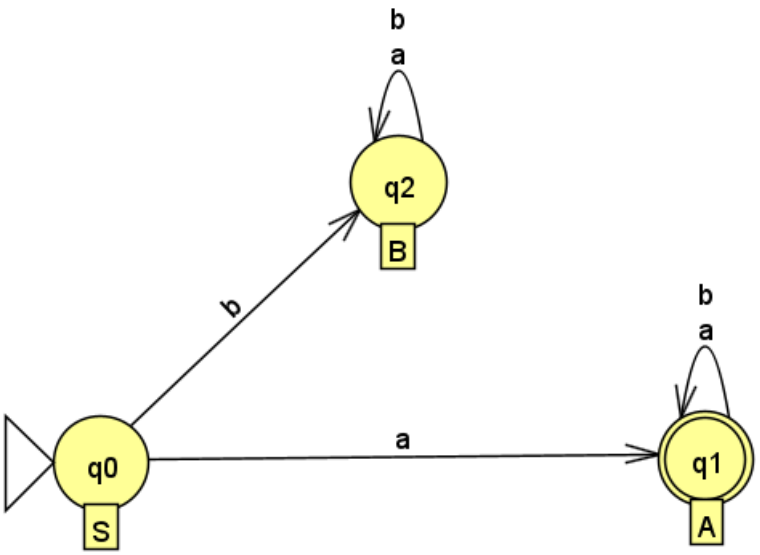
Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > "Finite Automaton."
Step 2: In the JFLAP interface, we have a blank canvas.
Step 3: We will design the given DFA on the canvas.
Step 4: Select "Convert" from the menu at the top and choose "Convert To Grammar".
Step 5: Click on each transition and for each transition the corresponding production rule is generated by JFLAP.
STOP

Output:

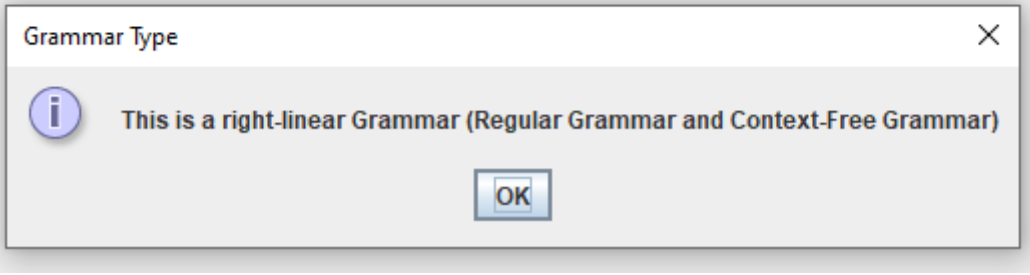
DFA Designed:





LHS		RHS
S	→	aA
S	→	bB
B	→	aB
B	→	bB
A	→	aA
A	→	bA
A	→	λ

LHS		RHS
S	→	aA
S	→	bB
A	→	λ
A	→	bA
A	→	aA
B	→	bB
B	→	aB



Problem Statement 13:

Demonstrate the usage of JFLAP tool to convert the given Right-Linear Grammar to equivalent DFA.

Given Production Rule:

LHS		RHS
S	→	aA
S	→	bB
A	→	λ
B	→	bB
B	→	aB
A	→	bA
A	→	aA
	→	

Description of the problem statement:

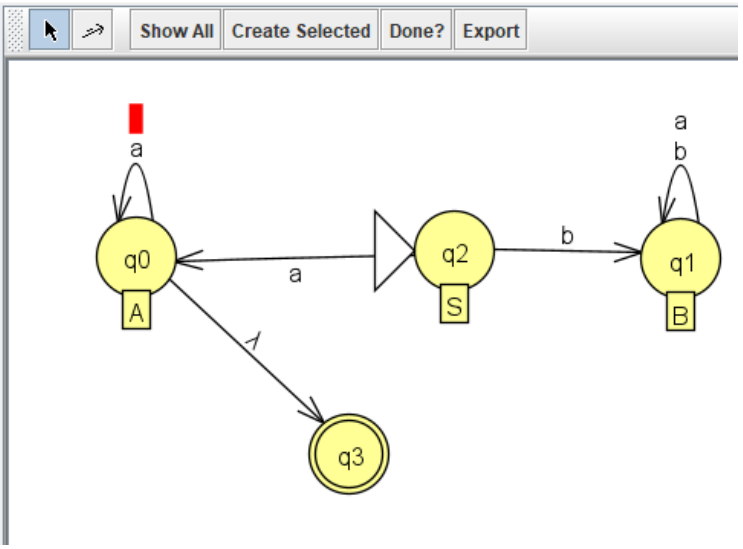
JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to convert the given Right-Linear Grammar to equivalent DFA.

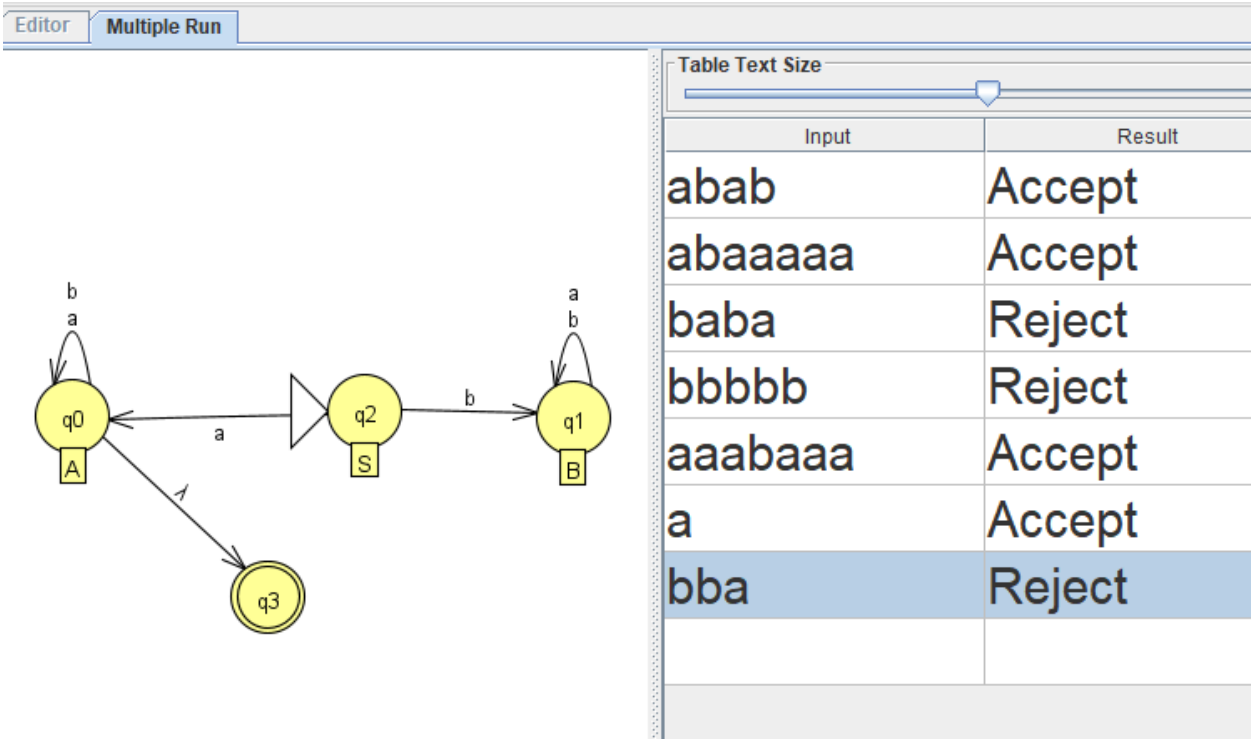
Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > "Grammar"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will fill the production rule on the table.
Step 4: Select "Convert" from the menu at the top and choose "Convert Right Linear Grammar To Finite Automata ".
Step 5: JFLAP will generate states according to the production rule and for each production rule, click on the “Create Selected” option on the canvas. This will generate the DFA.
STOP

OUTPUT:

Production	Created
S→aA	☑
S→bB	☑
A→λ	☑
B→bB	☑
B→aB	☑
A→bA	☑
A→aA	☑





Input	Result
abab	Accept
abaaaaa	Accept
baba	Reject
bbbbb	Reject
aaabaaa	Accept
a	Accept
bba	Reject

Problem Statement 14:

Demonstrate the usage of JFLAP tool to generate a derivation tree for a particular input string and given Right-Linear Grammar.

Given Production Rule:

LHS		RHS
S	→	aA
S	→	bB
A	→	λ
B	→	bB
B	→	aB
A	→	bA
A	→	aA
	→	

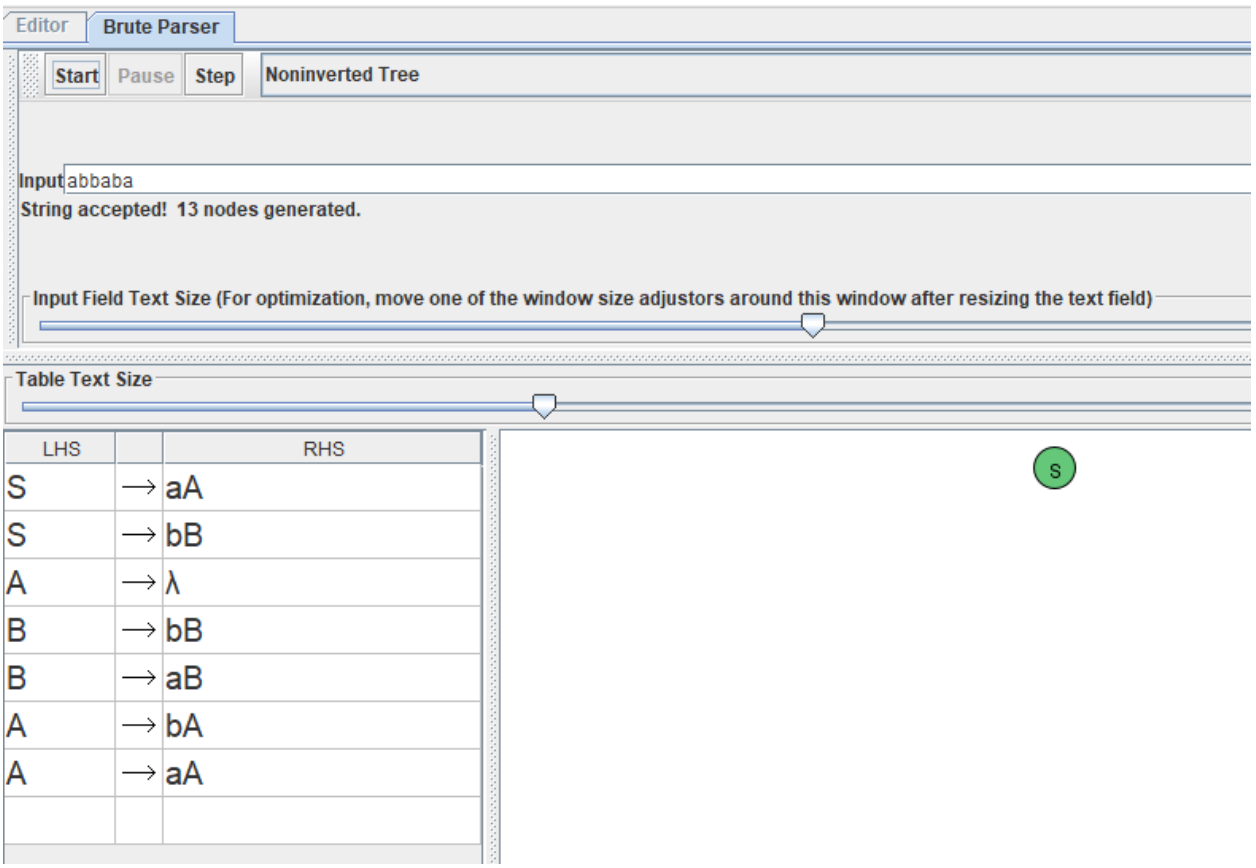
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to generate a derivation tree for a particular input string and given Right-Linear Grammar.

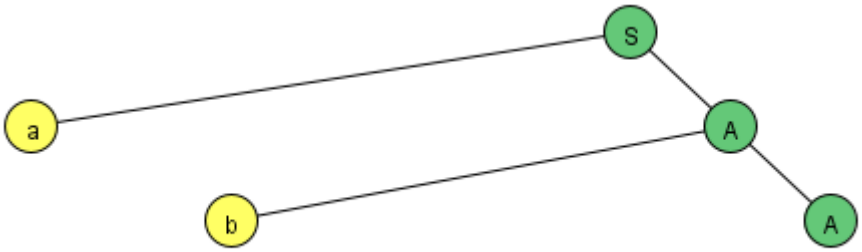
Steps:

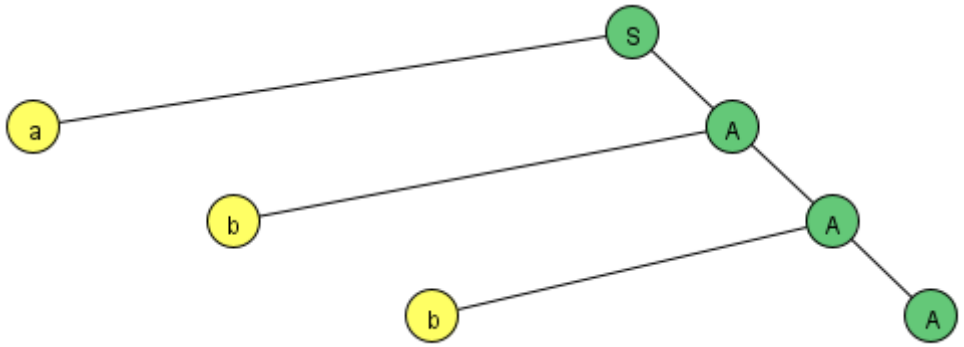
START
Step 1: Open JFLAP, Click on "File" > "New" > "Grammar"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will fill the production rule on the table.
Step 4: Select "Input" from the menu at the top and choose "Brute Force Parse".
Step 5: JFLAP will generate a new window where the input string is entered and for each character in the input string derivation tree is generated by JFLAP by clicking on the “Start” option for the first and “Step” for other characters.
STOP

Output:

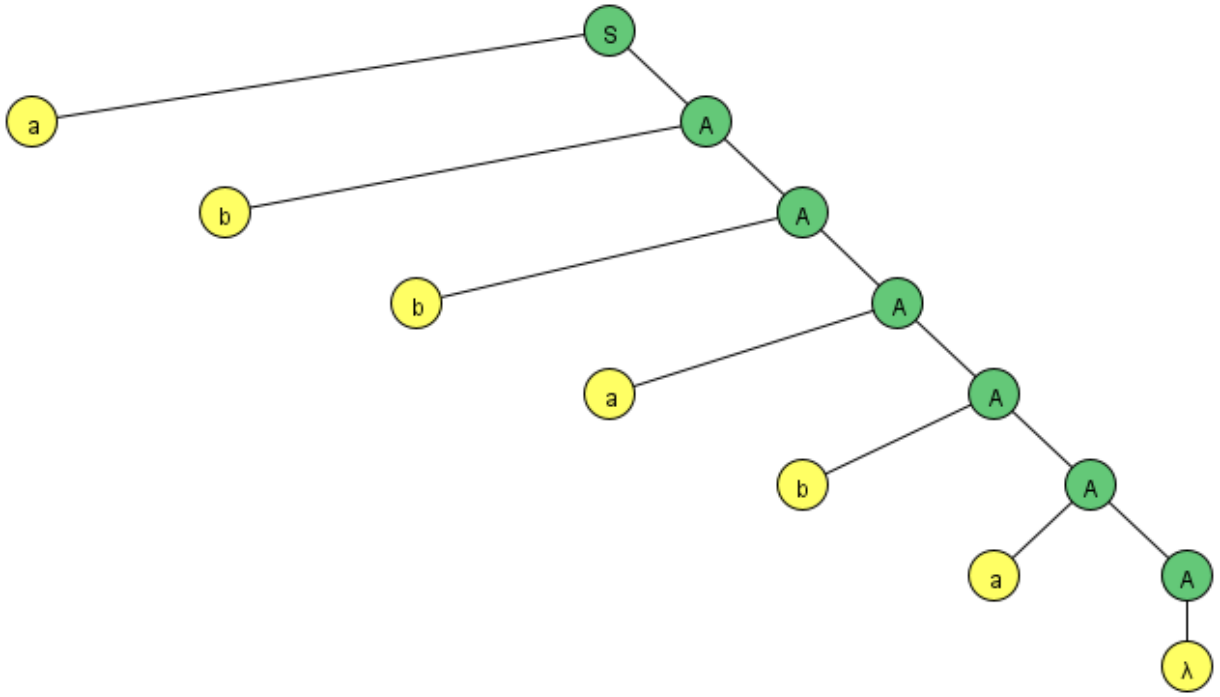

Editor
Brute Parser
Start
Pause
Step
Noninverted Tree
Input abbaba
String accepted! 13 nodes generated.
Input Field Text Size (For optimization, move one of the window size adjustors around this window after resizing the text field)
Table Text Size
LHS
RHS
S → aA
S → bB
A → λ
B → bB
B → aB
A → bA
A → aA
S


S
a
A


S
a
A
b
A



and so on…



Input abbaba

String accepted! 13 nodes generated.

Problem Statement 15:

Design and simulate Moore Machine in JFLAP to find 1's complement of a binary string.

Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to design and simulate Moore Machine in JFLAP to find 1's complement of a binary string.

Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > "Moore Machine"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will create states and transitions based on the Outputs.
Step 4: Select "Input" from the menu at the top and choose "Multiple Run" to simulate the Moore Machine.
Step 5: On the right side enter the binary strings to find the 1's complement and then click on "Run Inputs" from the right-bottom side.
STOP

Output:

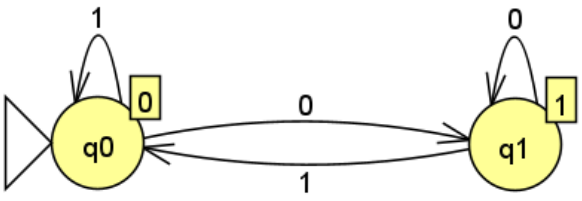


Table Text Size

Input	Result
00000	011111
111111	0000000
01011000	010100111
110101111	0001010000
110101	0001010
000001111	0111110000

Problem Statement 16:

Design and simulate Mealy Machine in JFLAP to find 1's complement of a binary string.

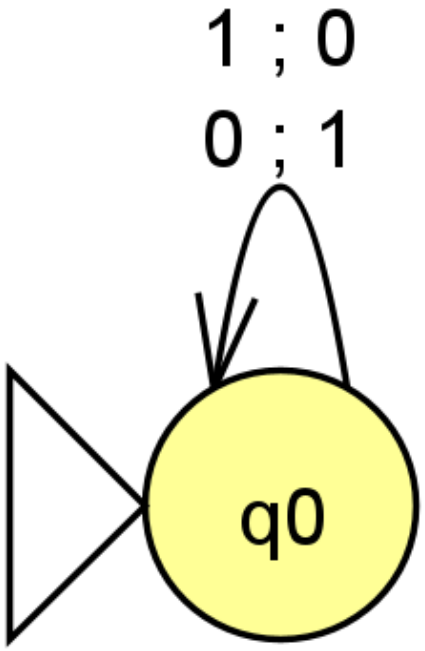
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to design and simulate Mealy Machine in JFLAP to find 1's complement of a binary string.

Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > "Moore Machine"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will create states and transitions based on the Outputs.
Step 4: Select "Input" from the menu at the top and choose "Multiple Run" to simulate the Moore Machine.
Step 5: On the right side enter the binary strings to find the 1's complement and then click on "Run Inputs" from the right-bottom side.
STOP

Output:



Input	Result
00000	11111
111111	000000
01011000	10100111
110101111	001010000
110101	001010
000001111	111110000

Problem Statement 17:

Demonstrate the usage of JFLAP tool to simulate PushDown Automata (PDA), for the following language $L=\{a^nb^n \mid n>=1, \sum=\{a,b\}\}$.

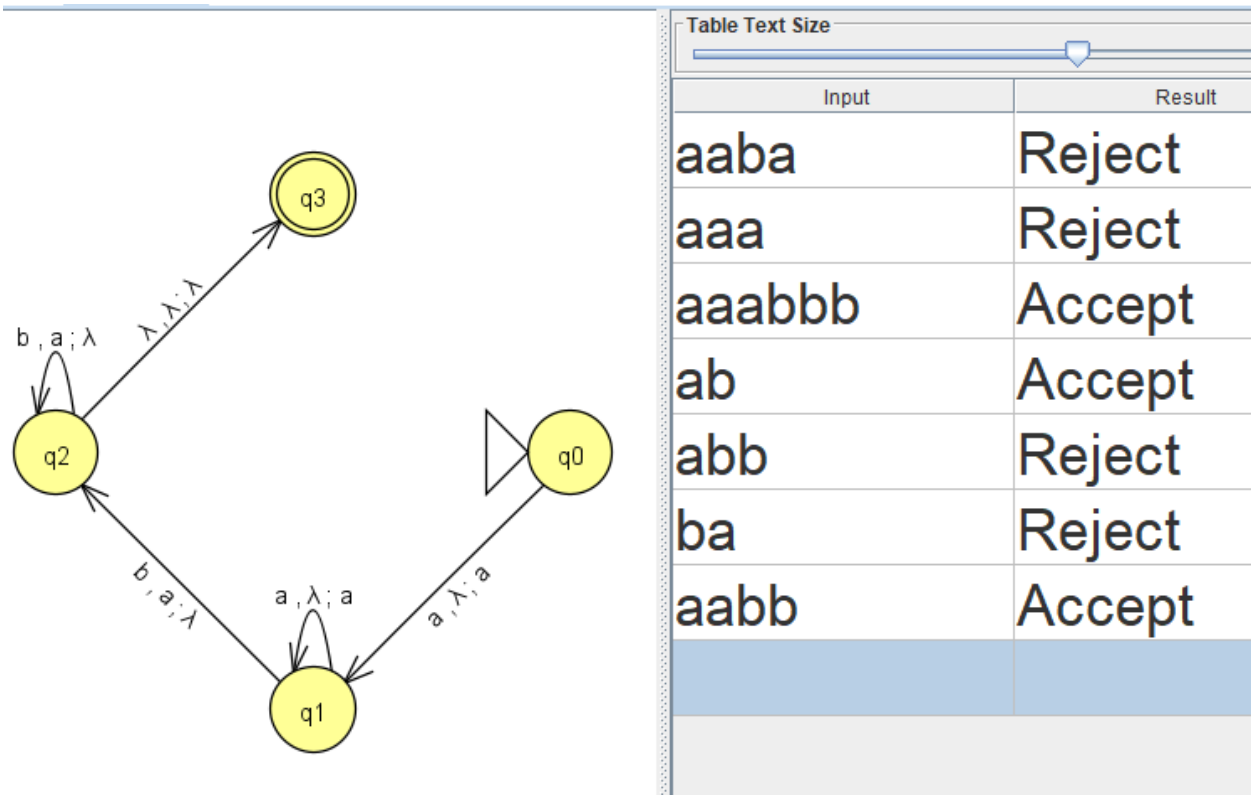
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to design and simulate simulate PushDown Automata (PDA), for the given language.

Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > " Pushdown Automaton"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will create states, transitions, and a stack to keep track of the 'a's and 'b's.
Step 4: Select "Input" from the menu at the top and choose "Multiple Run" to simulate the Moore Machine.
Step 5: On the right side enter the input strings to test the PDA and then click on “Run Inputs” from the right-bottom side.
STOP

Output:



Problem Statement 18:

Demonstrate the usage of JFLAP tool to convert the following Context Free Grammar to NPDA, G=(VN, VT, S, P) where set of productions are given as:

LHS		RHS
S	→	aTb
S	→	b
T	→	Ta
T	→	λ

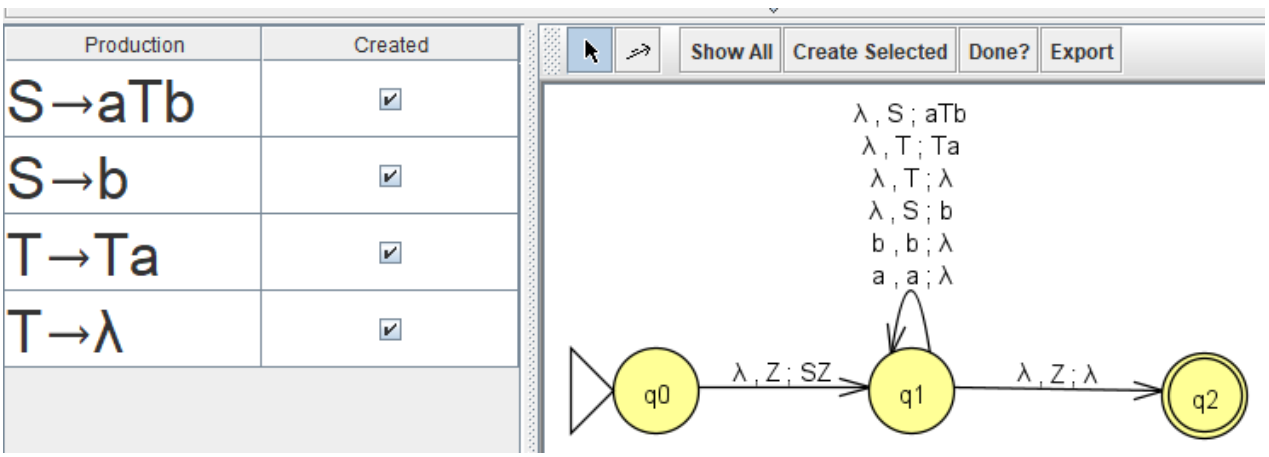
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to convert the following Context Free Grammar to NPDA.

Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > "Grammar"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will fill the production rule on the table.
Step 4: Select "convert" from the menu at the top and choose "CFG to PDA(LL)".
Step 5: JFLAP will generate a new window where the NPDA is displayed.
STOP

Output:



Problem Statement 19:

Demonstrate the usages of JFLAP tool to simulate LL (1) top-down parser.

Given Production Rule:

LHS		RHS
S	→	aABb
A	→	aAc
A	→	λ
B	→	bB
B	→	c
	→	

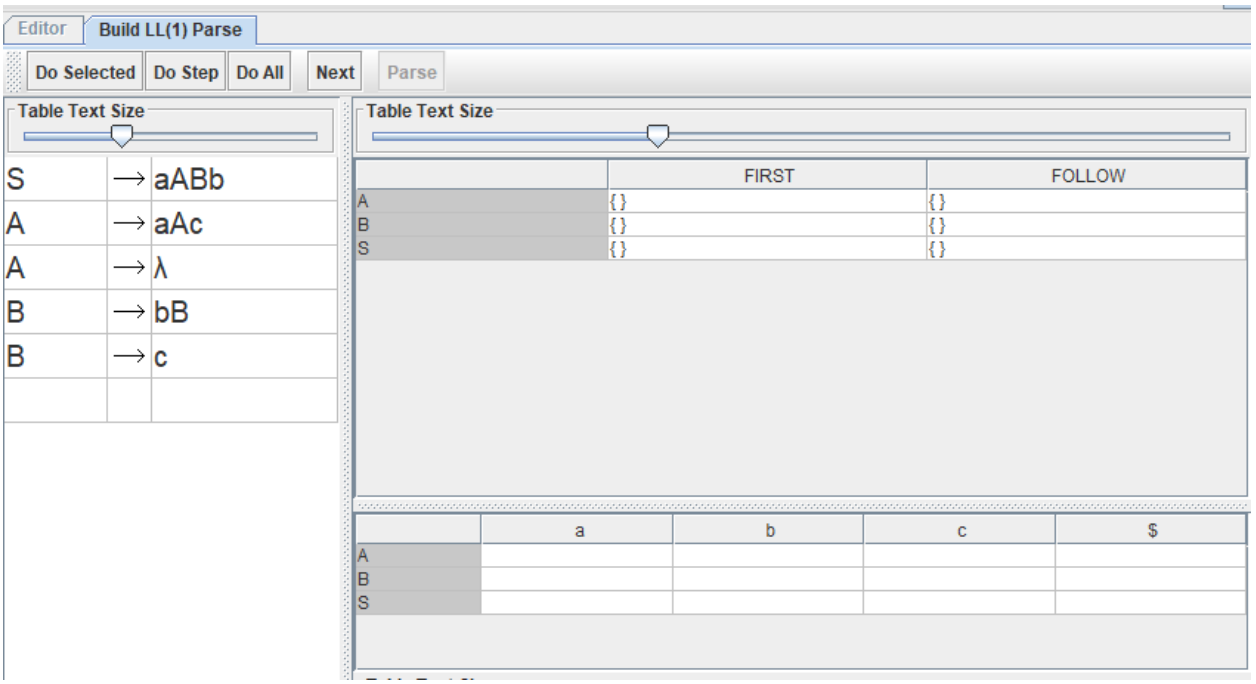
Description of the problem statement:

JFLAP (Java Formal Language Automata Package) is a popular java tool for designing and simulating finite automata and other formal languages. This demonstrates how to use JFLAP to to simulate LL (1) top-down parser.

Steps:

START
Step 1: Open JFLAP, Click on "File" > "New" > "Grammar"
Step 2: In the JFLAP interface, we have a blank table.
Step 3: We will fill the production rule on the table.
Step 4: Click on “Input” and then “Build LL(1) Parse Table".
Step 5: Now fill the first, follow sets and LL(1) Parse Table for the given production rules.
Step 6: Click on “Parse” option and then enter a test string and then simulate the string.
STOP

Output:


Editor
Build LL(1) Parse
Do Selected
Do Step
Do All
Next
Parse
Table Text Size
S → aABb
A → aAc
A → λ
B → bB
B → c
Table Text Size
FIRST
FOLLOW
A { }
B { }
S { }
a
b
c
$
A
B
S

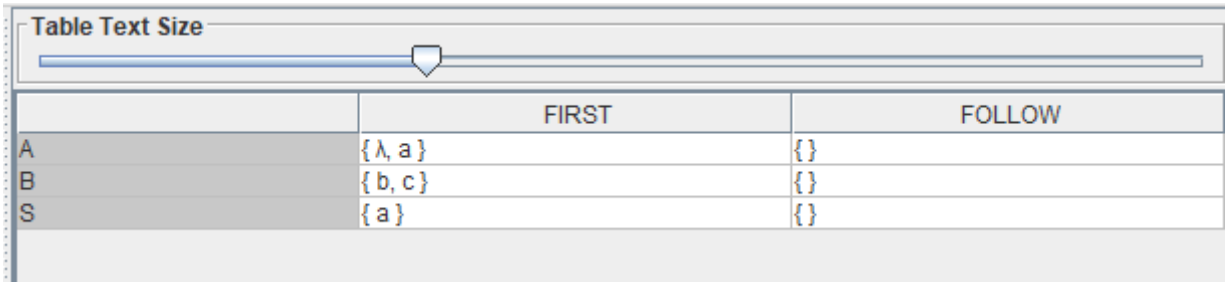


Table Text Size
FIRST
FOLLOW
A { λ, a } { }
B { b, c } { }
S { a } { }

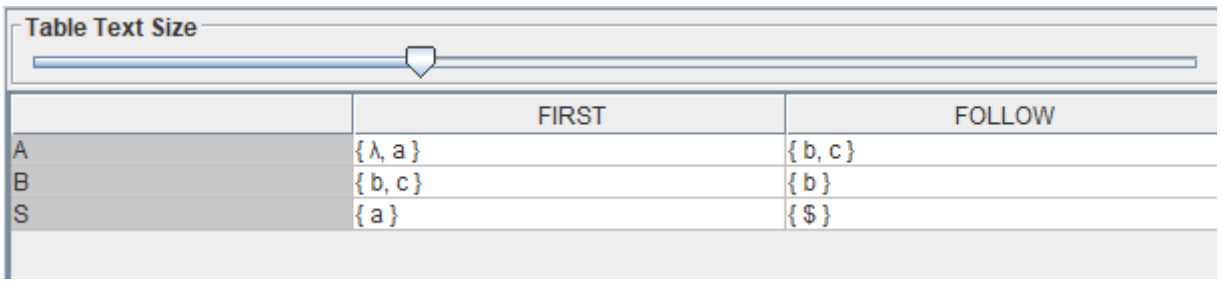
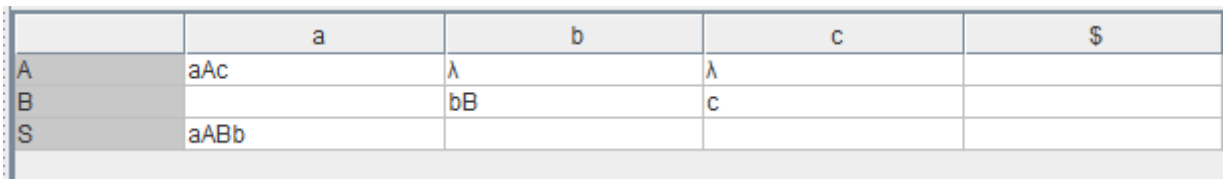


Table Text Size
FIRST
FOLLOW
A { λ, a } { b, c }
B { b, c } { b }
S { a } { $ }


a
b
c
$
A aAc λ λ
B bB c
S aABb

Parsing:

For String: aaaacccbbcb