Bangalore Institute of Technology

K.R. ROAD, BENGALURU-560004.

Department of Computer Science and Engineering

Automata Theory and Computability
18CS54

Assignment

Submitted by
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SEM - 5
SEC - A

Faculty In-charge
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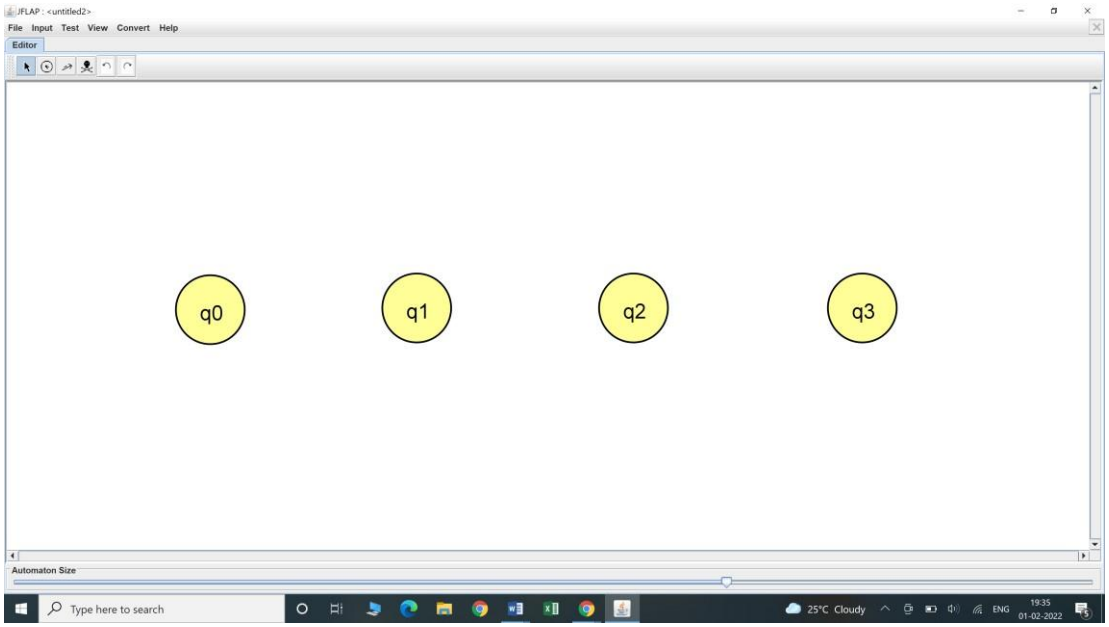
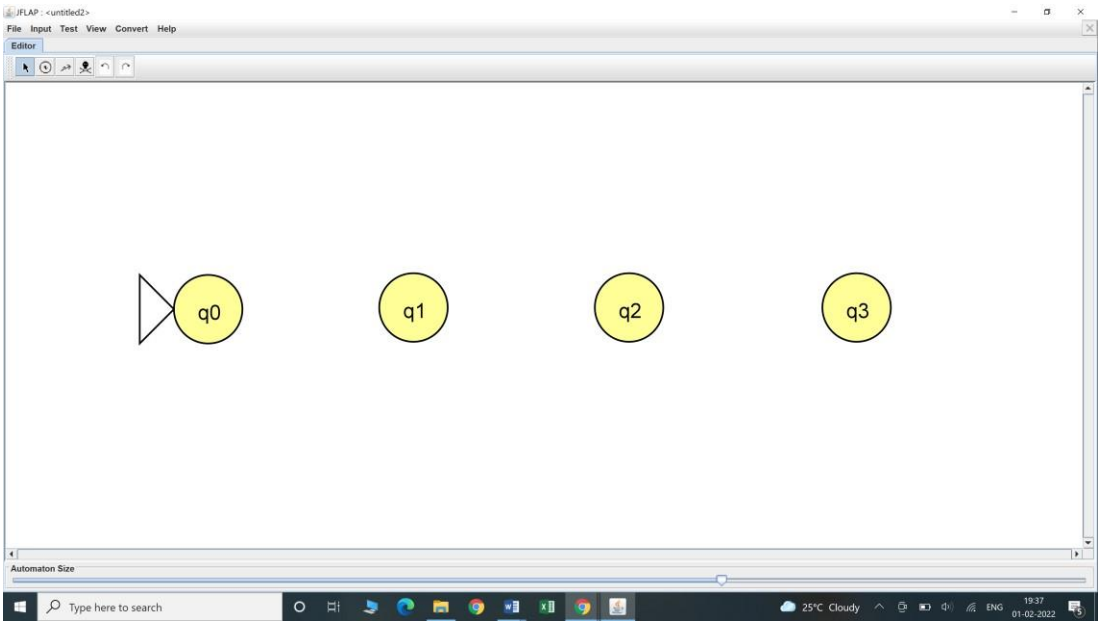
Tracing of machines:

1)Obtain a DFSM such that, L = { w $\in$ {a,b}* : w contains the substring ending with abb}

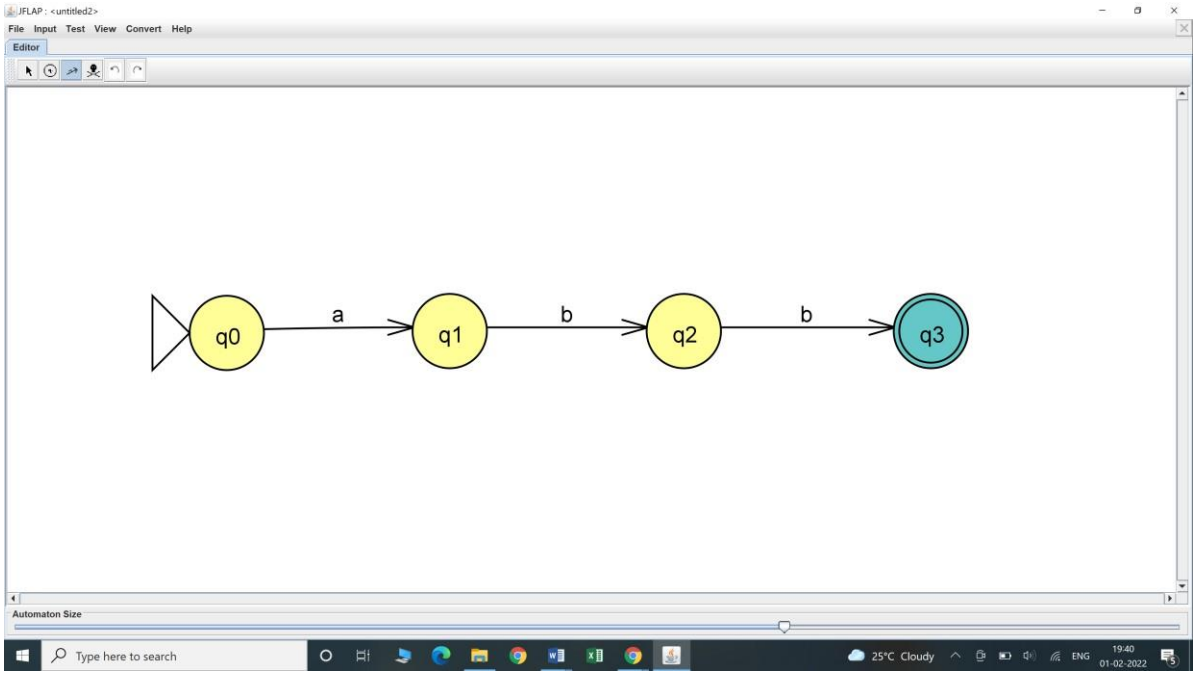
Step 1: For a machine to end with abb as a substring, 4 states are required.



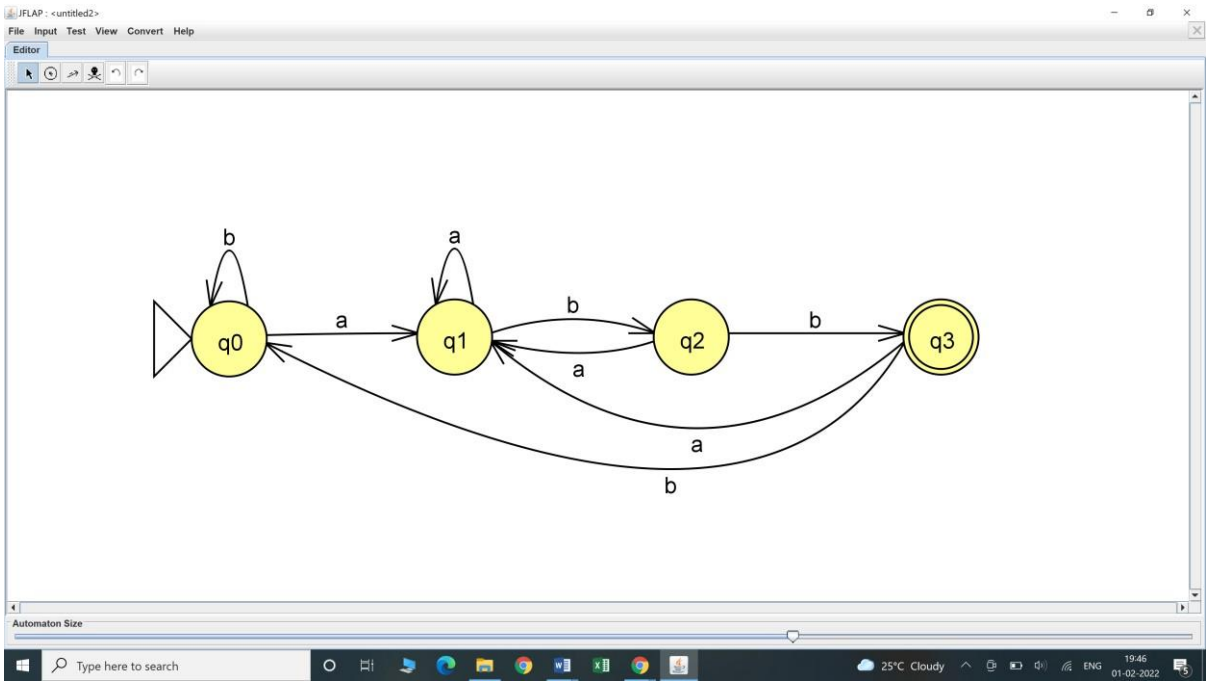
Step 2: Mark the initial state



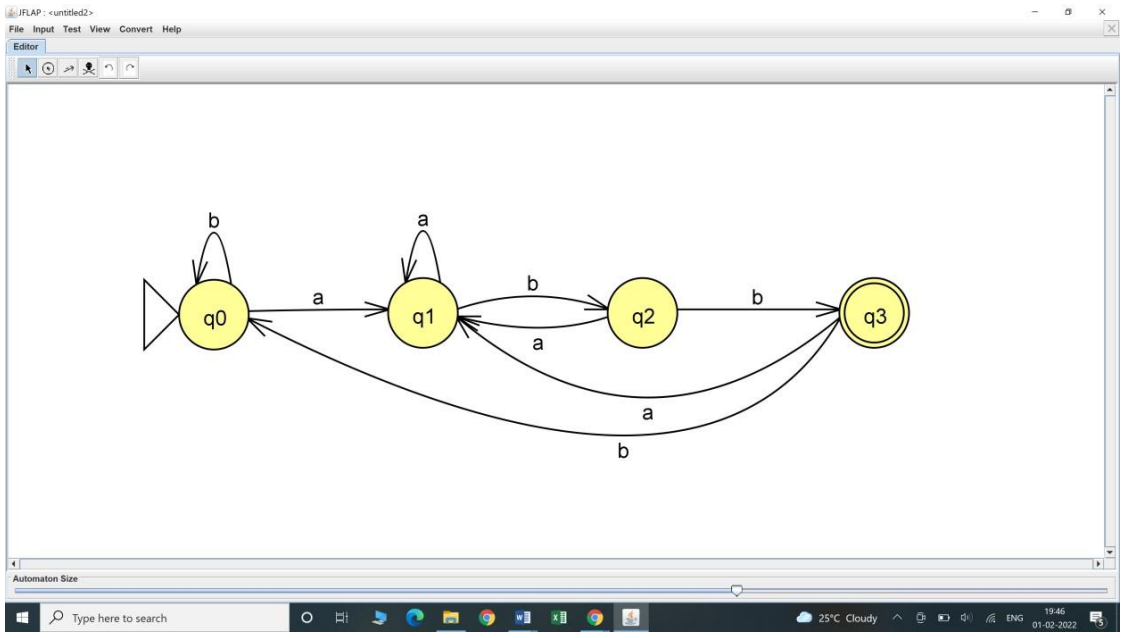
Step 3: Mark the final state showing that machine accepts substring abb.



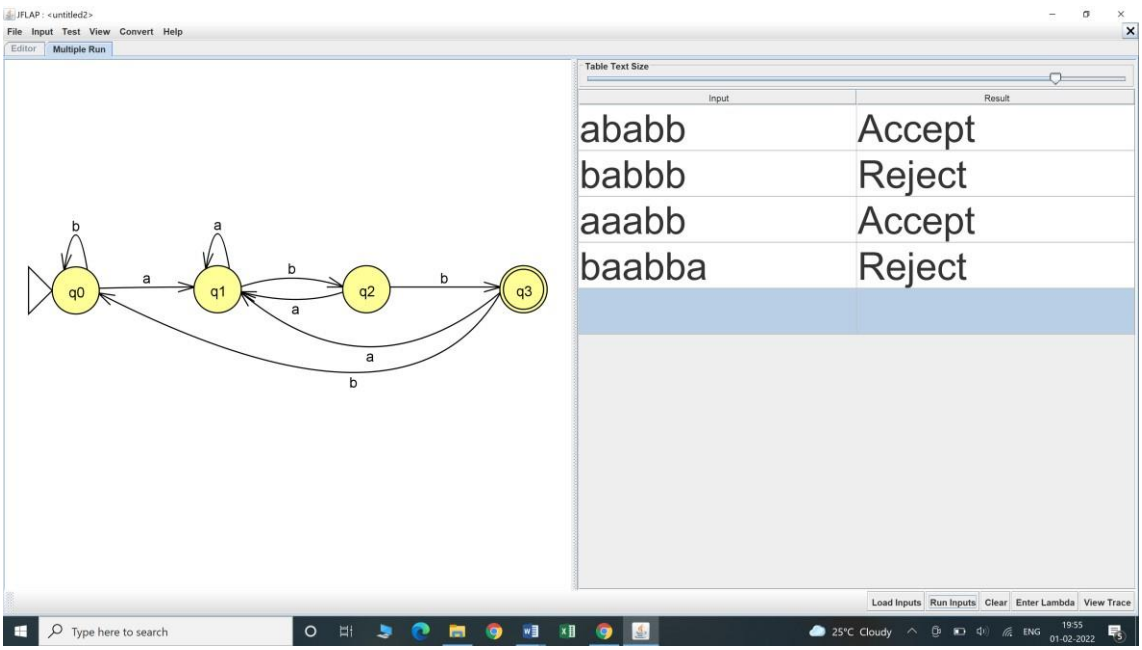
Step 4: Since there are two input alphabets, each state should make transition upon those two input alphabets.



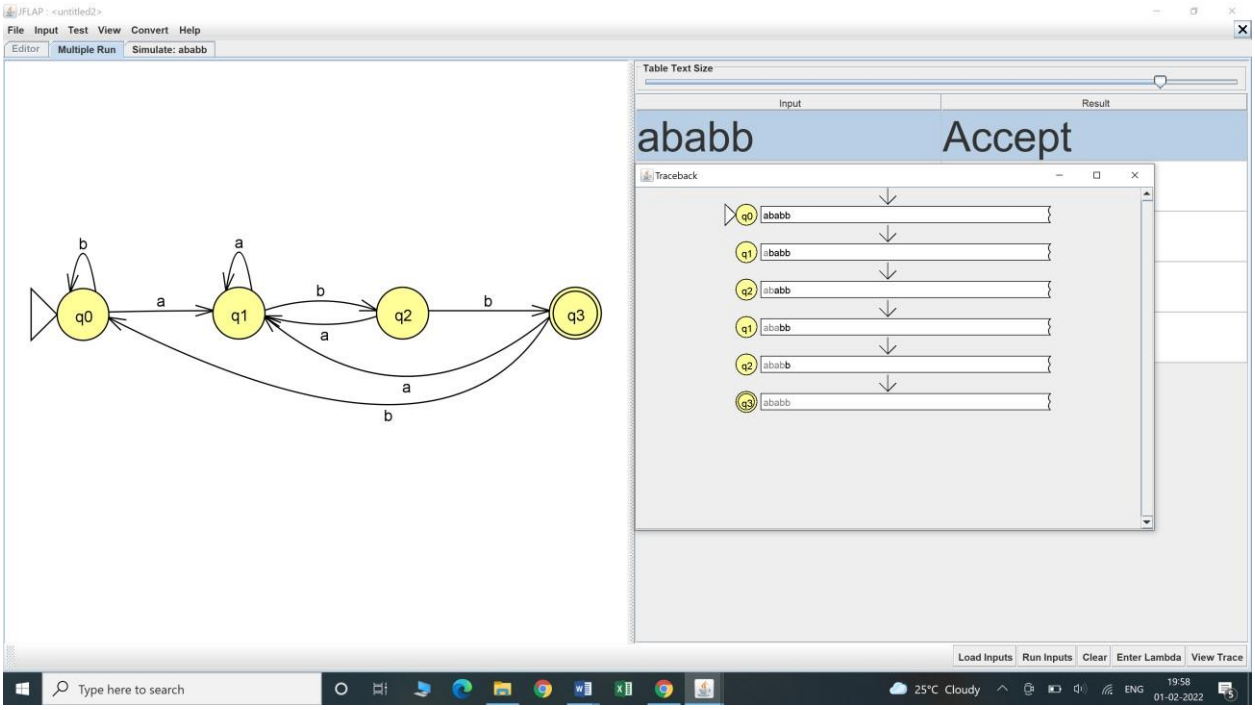
Step 5: The final DFSM for a machine to accept strings of a's and b's and contain a substring ending with abb is



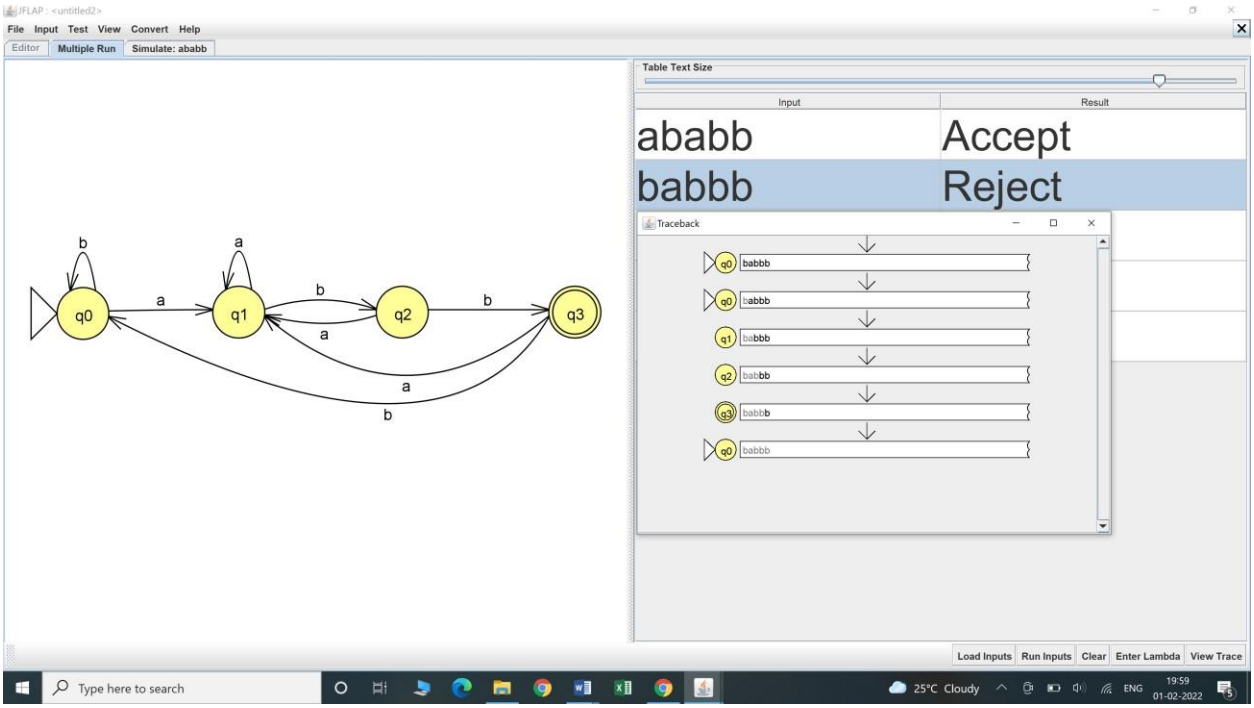
Consider few strings of the following inputs showing whether the machine accept/reject the string



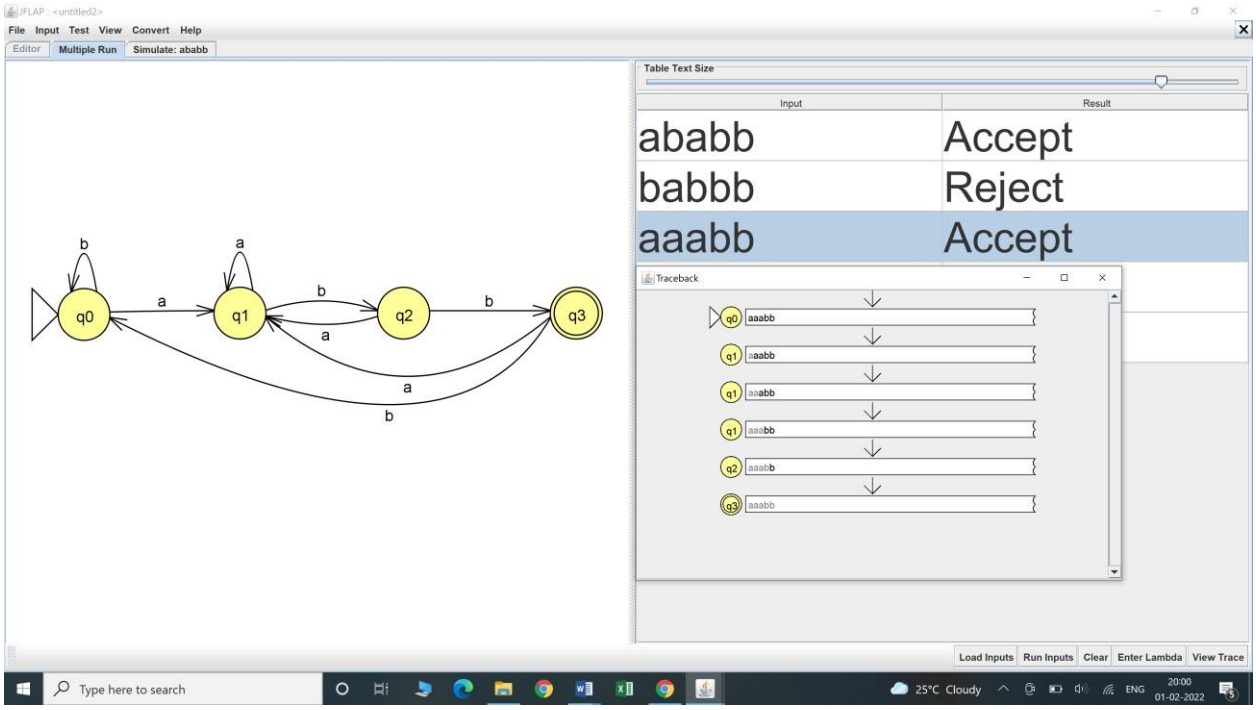
Accept



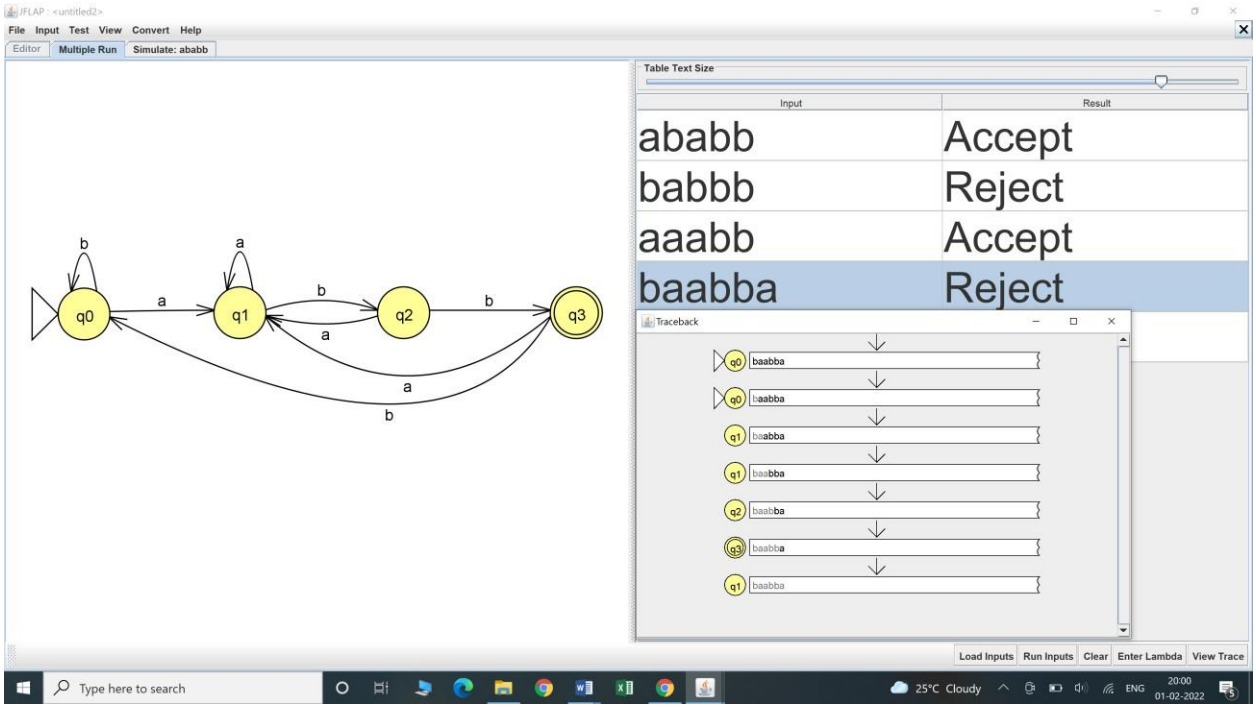
Reject



Accept



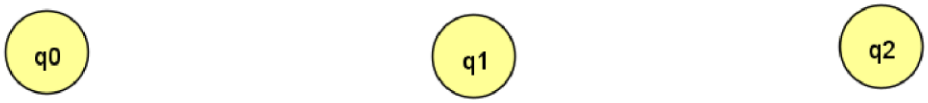
Reject



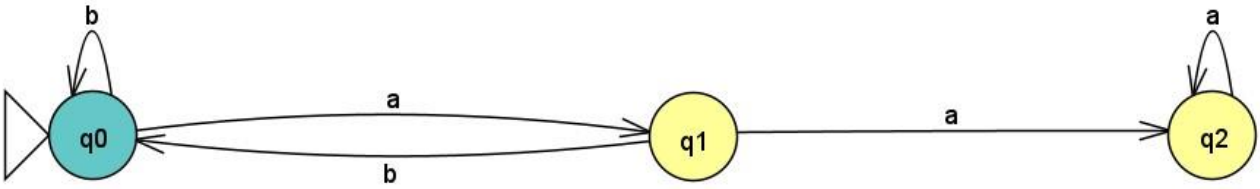
2)Obtain a DFSM for the language L = {w ∈ {a, b}*: w does not contain the string aab}

Step 1: For the DFSM to not contain aab as substring we need three states.Type your text

Step 2:Mark q0 as initial state.

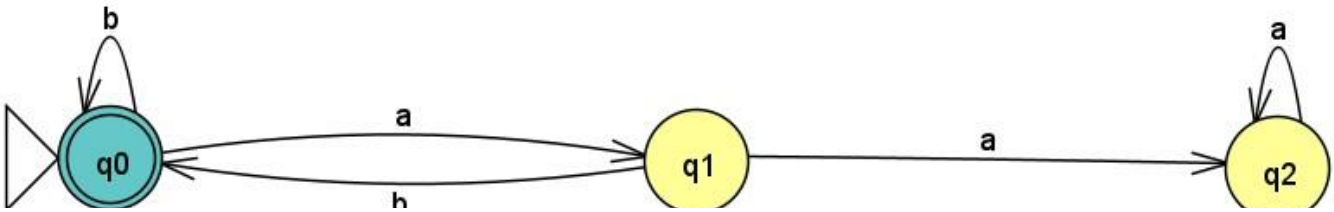


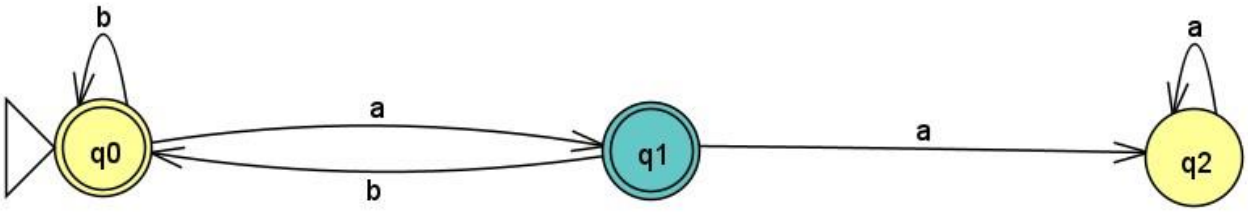
Step 3: For the language to contain no aab as a substring we make the transitions as following..

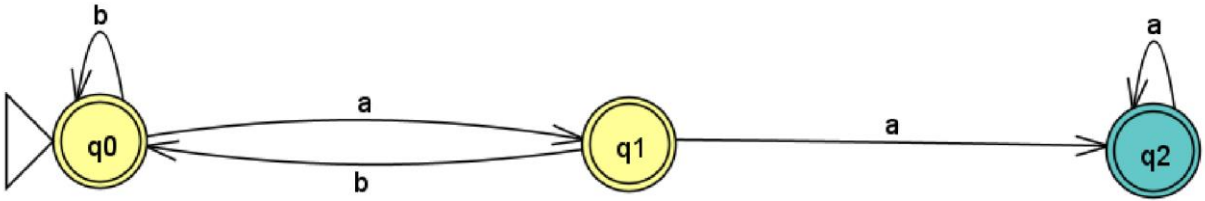


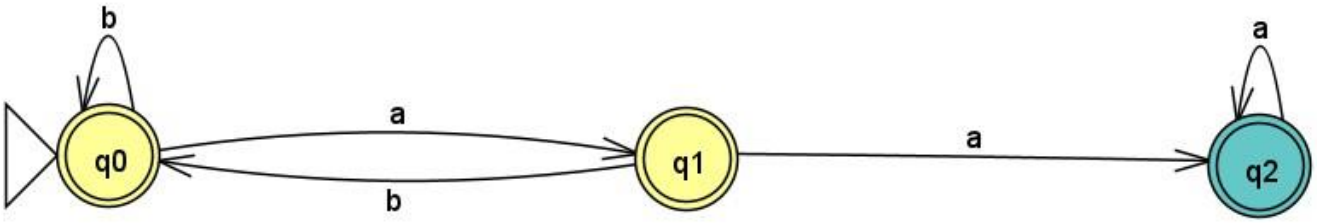
Step 4: Mark q0,q1 and q2 as final states.

Step 5: The final DFSM is





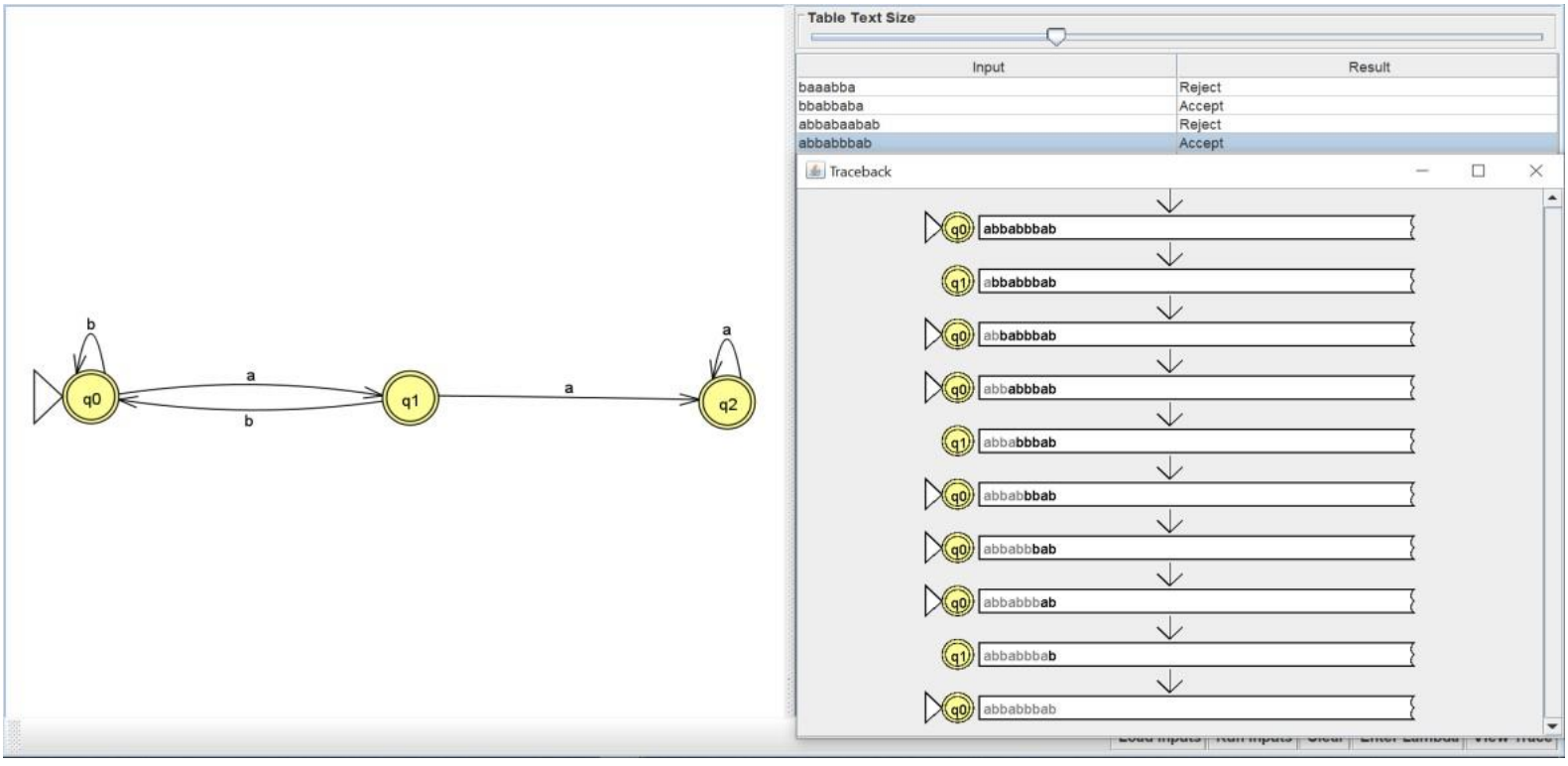


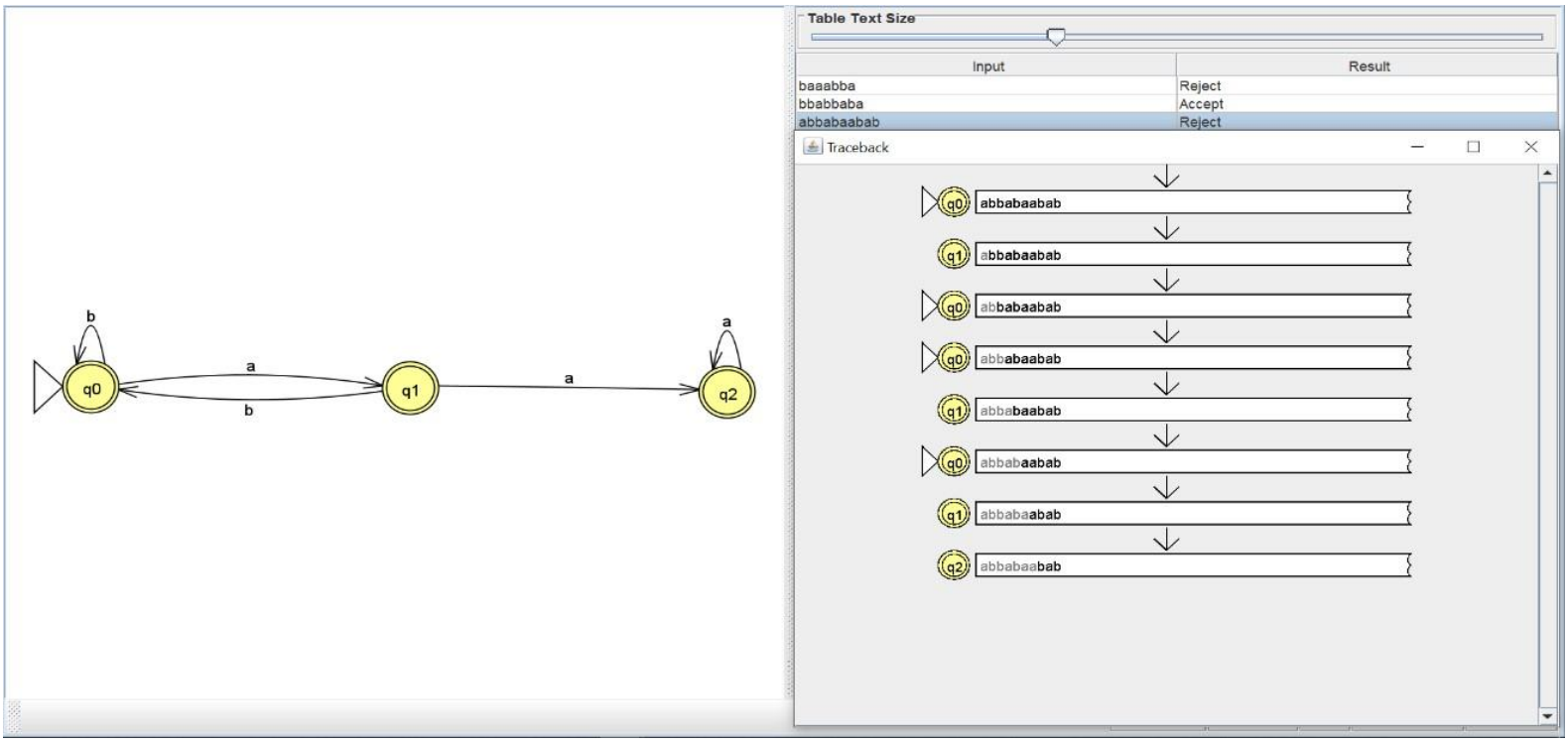


Consider few strings of the following inputs showing whether the machine accept/reject the string

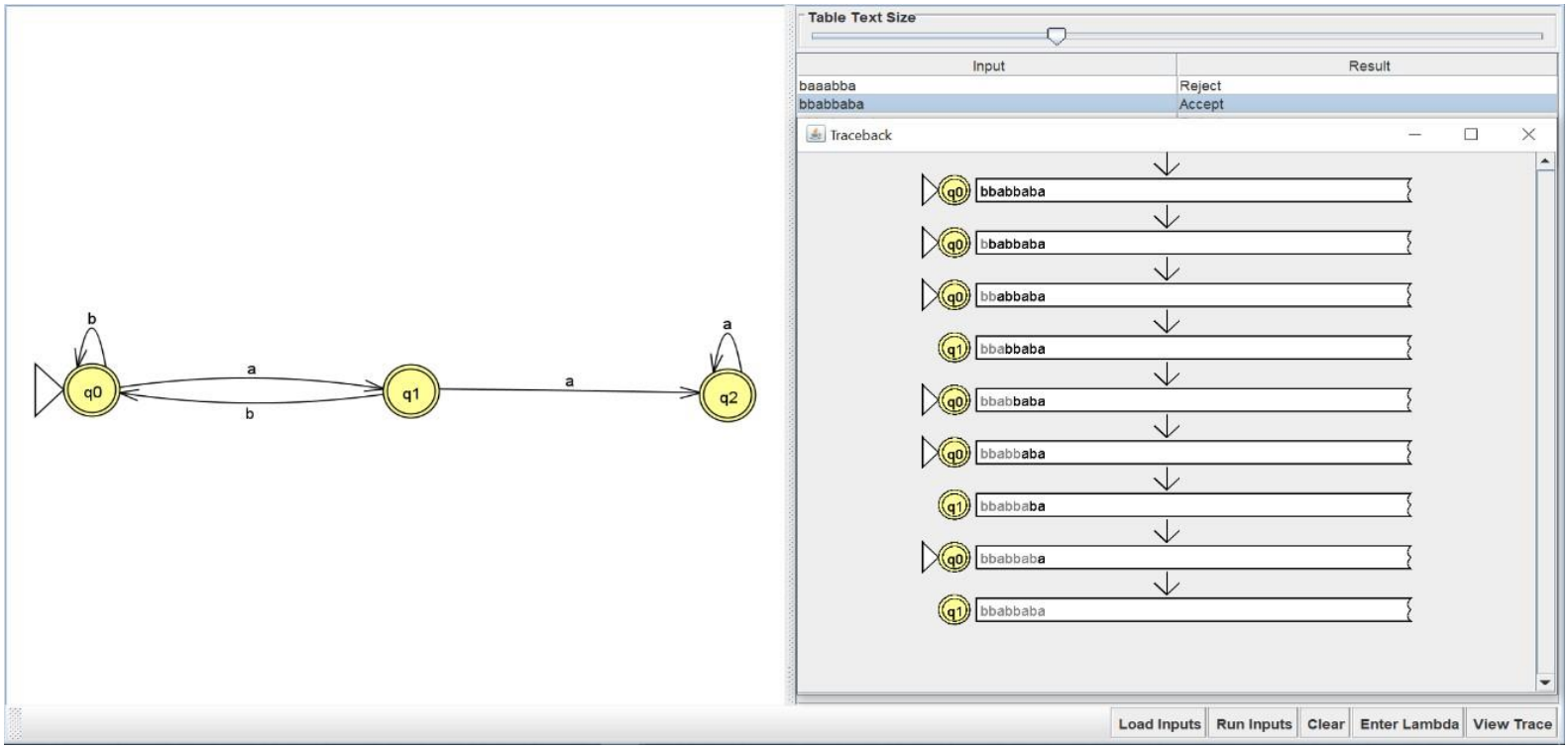
ACCEPT

REJE

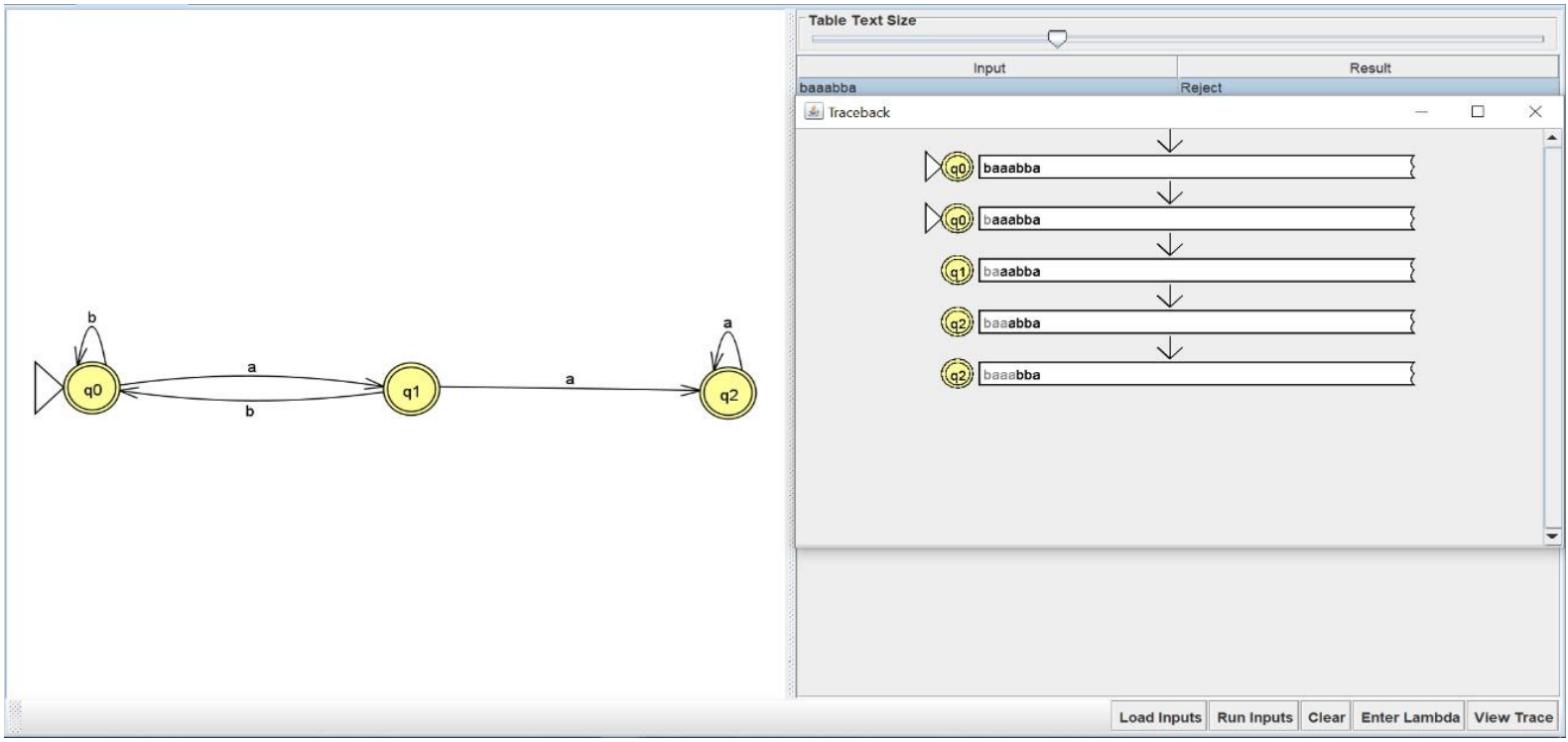



b
a
a
q0
q1
q2
a
b
Table Text Size
Input
Result
baaabba
Reject
bbabbaba
Accept
abbabaabab
Reject
Traceback
q0 abbabaabab
q1 abbabaabab
q0 abbabaabab
q0 abbabaabab
q1 abbabaabab
q0 abbabaabab
q1 abbabaabab
q2 abbabaabab

EP


b
a
a
q0
q1
q2
a
b
Table Text Size
Input
Result
baaabba
Reject
bbabbaba
Accept
Traceback
q0 bbabbaba
q0 bbabbaba
q0 bbabbaba
q1 bbabbaba
q0 bbabbaba
q0 bbabbaba
q1 bbabbaba
q0 bbabbaba
q1 bbabbaba
Load Inputs
Run Inputs
Clear
Enter Lambda
View Trace

REJE


q0
q1
q2
a
b
a
b
a
Table Text Size
Input
Result
baaabba
Reject
Traceback
q0 baaabba
q0 baaabba
q1 baaabba
q2 baaabba
q2 baaabba
Load Inputs
Run Inputs
Clear
Enter Lambda
View Trace

Grammars:

1)Convert the given grammar to Chomsky Normal Form

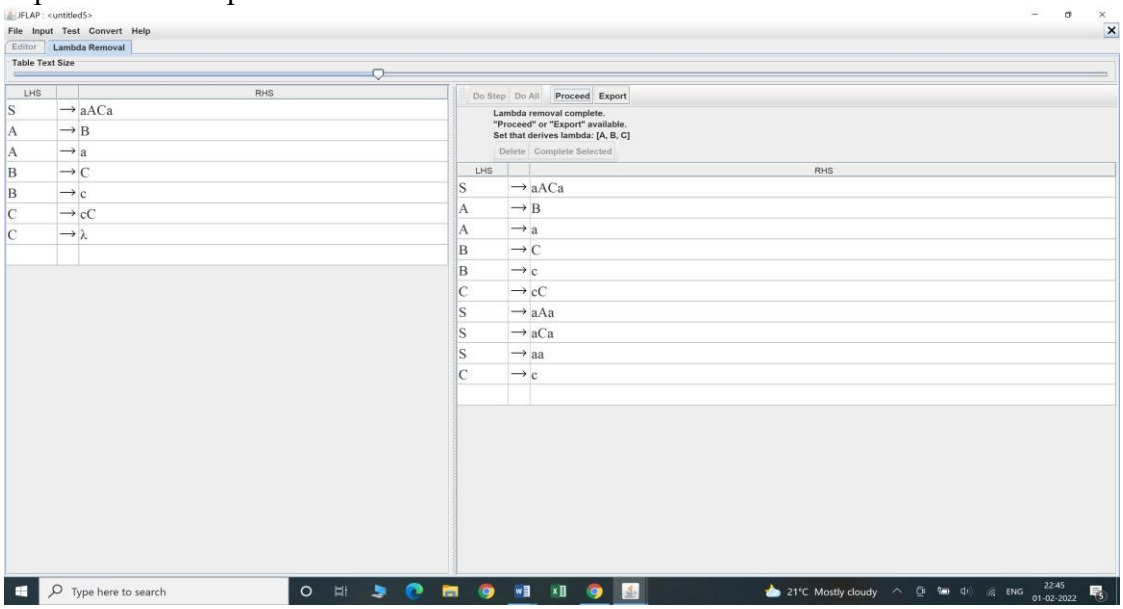
S -> aACa

A -> B|a

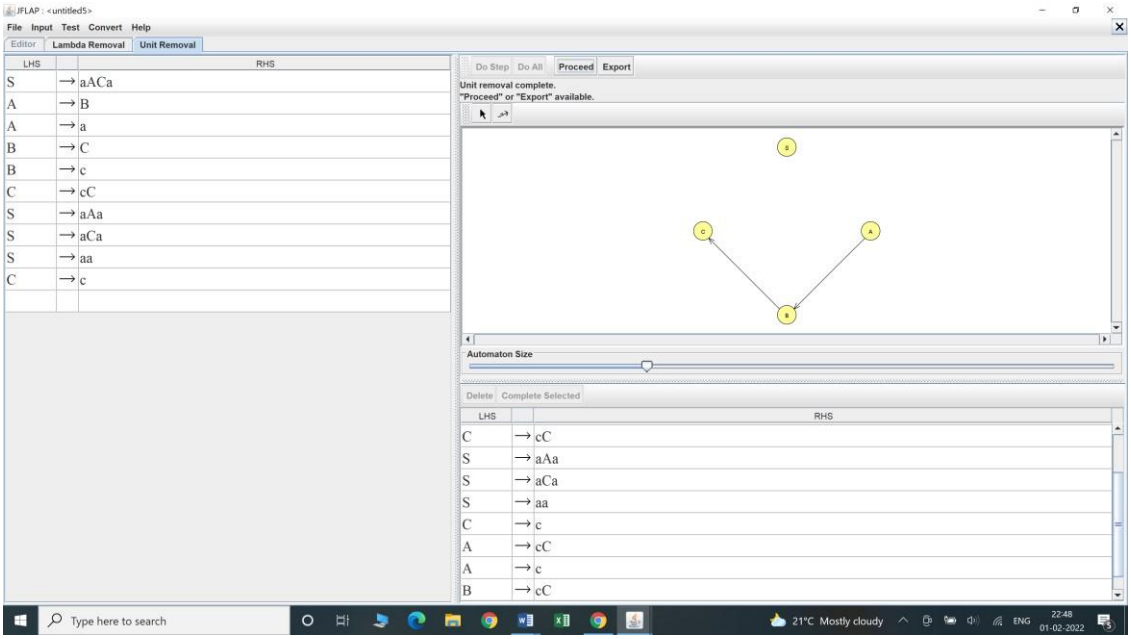
B -> C| c

C -> cC | ε

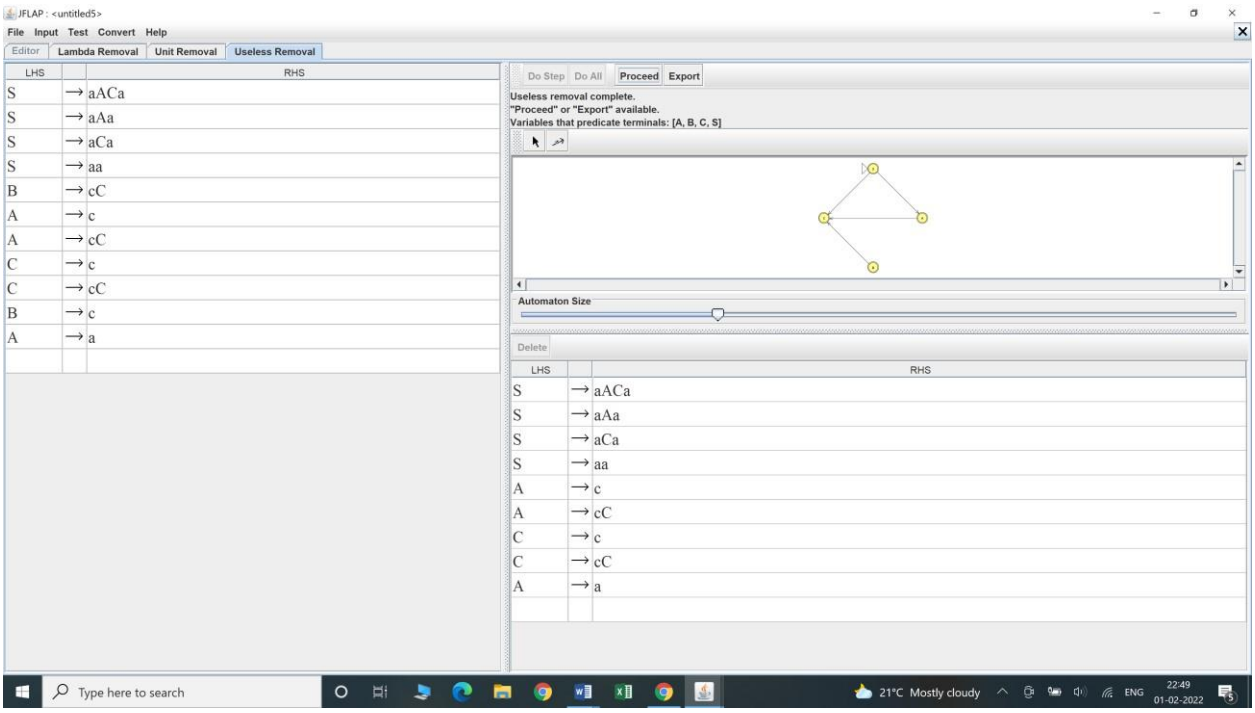
Step 1: Remove ε productions



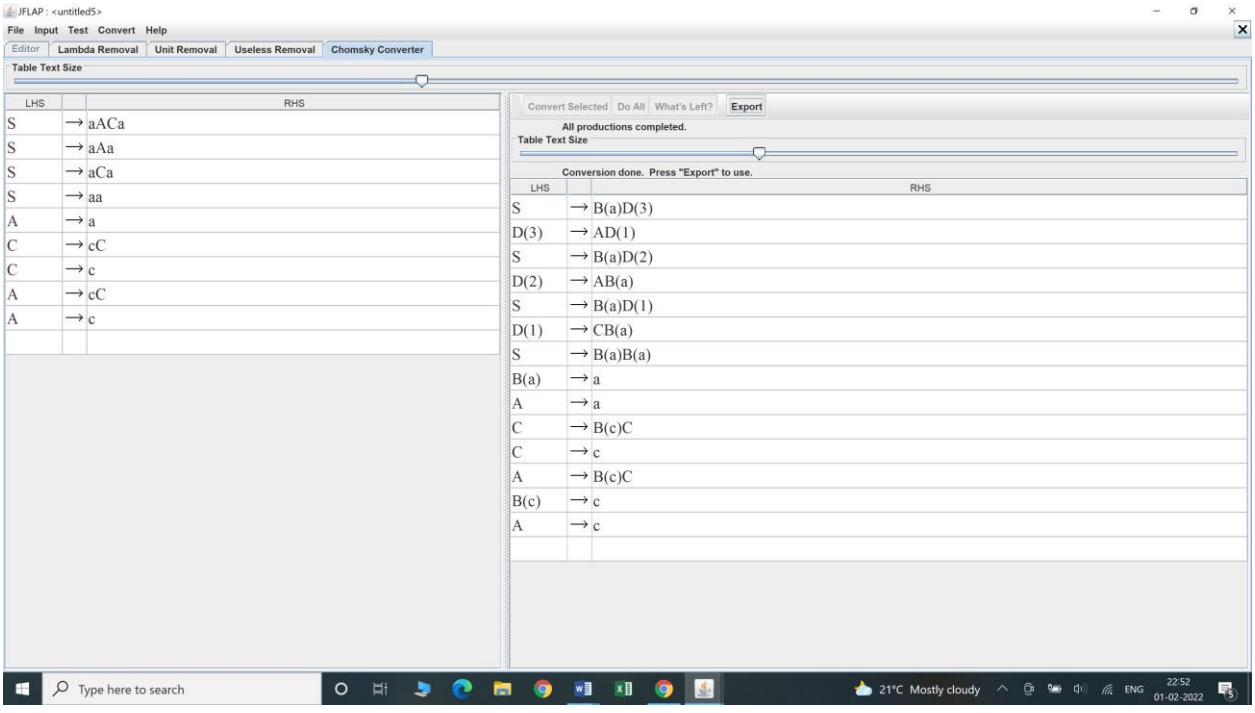
Step 2: Remove unit productions



Step 3: Remove mixed productions


JFLAP : <untitled5>
File Input Test Convert Help
Editor Lambda Removal Unit Removal Useless Removal
LHS RHS
S → aACa
S → aAa
S → aCa
S → aa
B → cC
A → c
A → cC
C → c
C → cC
B → c
A → a
Do Step Do All Proceed Export
Useless removal complete.
"Proceed" or "Export" available.
Variables that predicate terminals: [A, B, C, S]
Automaton Size
Delete
LHS RHS
S → aACa
S → aAa
S → aCa
S → aa
A → c
A → cC
C → c
C → cC
A → a
Type here to search
21°C Mostly cloudy
ENG
22:49
01-02-2022

Step 4: CNF


JFLAP : <untitled5>
File Input Test Convert Help
Editor Lambda Removal Unit Removal Useless Removal Chomsky Converter
Table Text Size
LHS RHS
S → aACa
S → aAa
S → aCa
S → aa
A → a
C → cC
C → c
A → cC
A → c
Convert Selected Do All What's Left? Export
All productions completed.
Table Text Size
Conversion done. Press "Export" to use.
LHS RHS
S → B(a)D(3)
D(3) → AD(1)
S → B(a)D(2)
D(2) → AB(a)
S → B(a)D(1)
D(1) → CB(a)
S → B(a)B(a)
B(a) → a
A → a
C → B(c)C
C → c
A → B(c)C
B(c) → c
A → c
Type here to search
21°C Mostly cloudy
ENG
22:52
01-02-2022

2)Convert the given grammar to Chomsky Normal Form

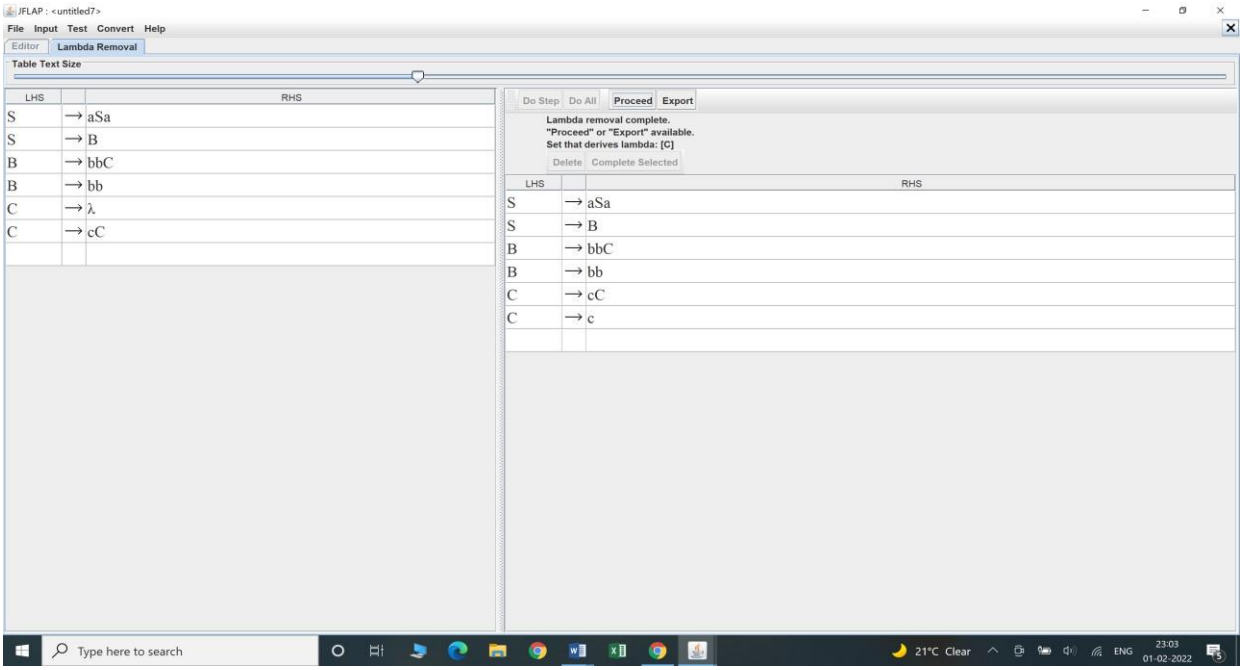
S -> aSa

S -> B

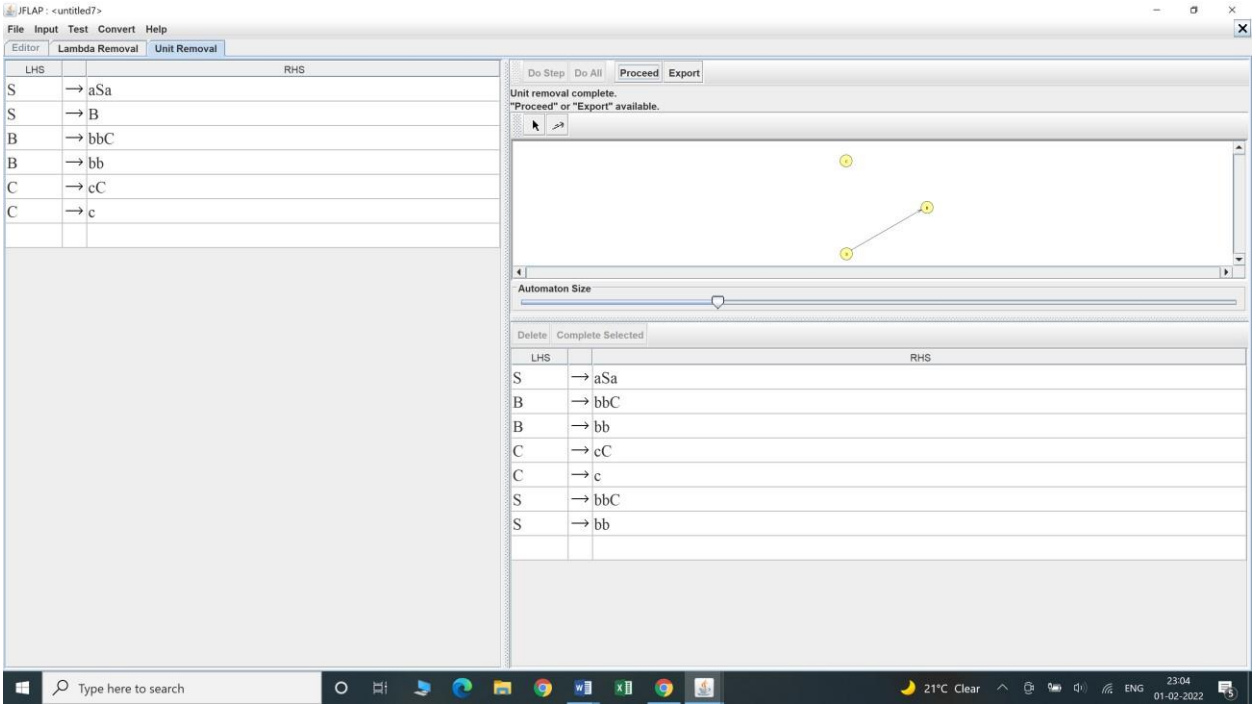
B -> bbC | bb C

-> ε| cC

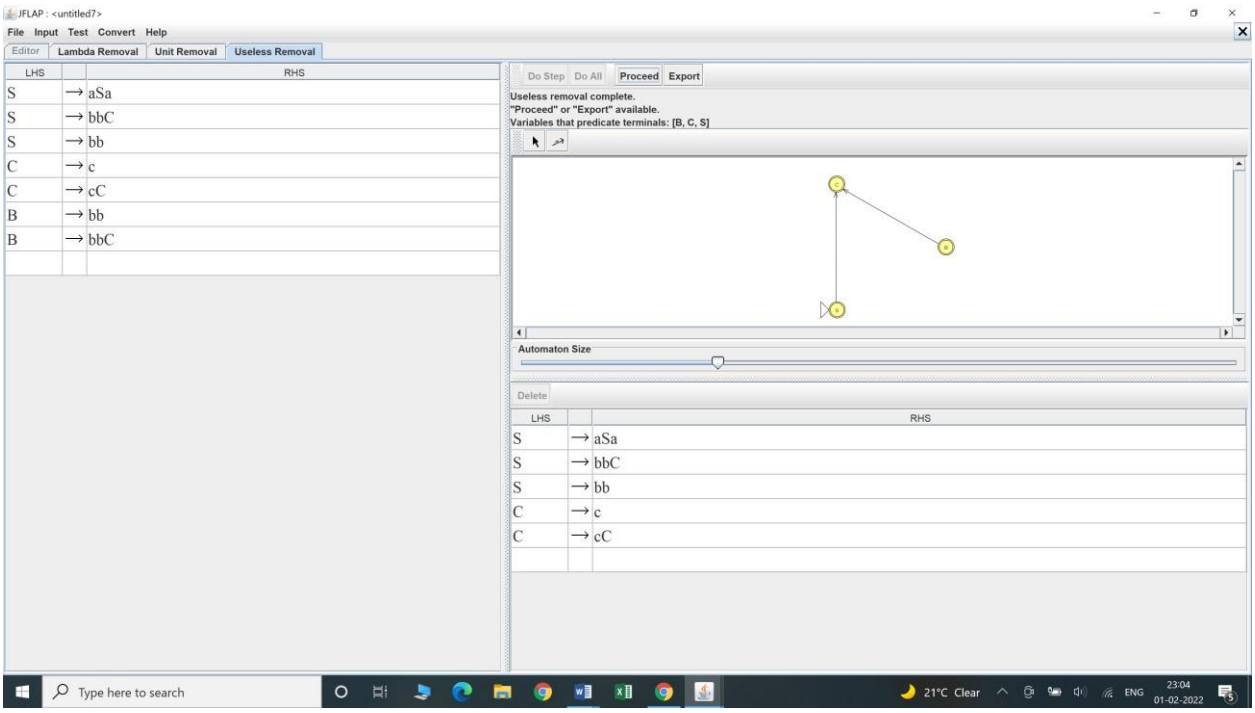
Step 1: Remove ε productions



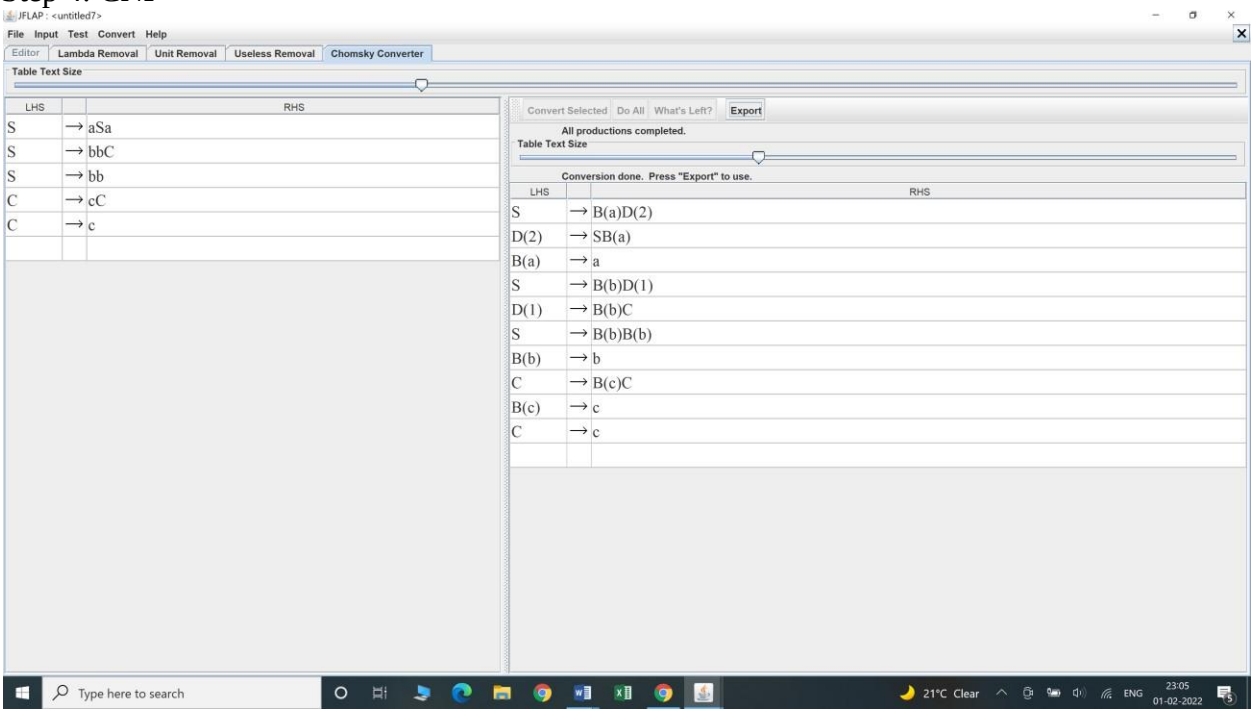
Step 2: Remove unit productions



Step 3: Remove mixed productions


JFLAP : <untitled7>
File Input Test Convert Help
Editor Lambda Removal Unit Removal Useless Removal
LHS RHS
S → aSa
S → bbC
S → bb
C → c
C → cC
B → bb
B → bbC
Do Step Do All Proceed Export
Useless removal complete.
"Proceed" or "Export" available.
Variables that predicate terminals: [B, C, S]
Automaton Size
Delete
LHS RHS
S → aSa
S → bbC
S → bb
C → c
C → cC
Type here to search
21°C Clear
ENG
23:04
01-02-2022

Step 4: CNF


JFLAP : <untitled7>
File Input Test Convert Help
Editor Lambda Removal Unit Removal Useless Removal Chomsky Converter
Table Text Size
LHS RHS
S → aSa
S → bbC
S → bb
C → cC
C → c
Convert Selected Do All What's Left? Export
All productions completed.
Table Text Size
Conversion done. Press "Export" to use.
LHS RHS
S → B(a)D(2)
D(2) → SB(a)
B(a) → a
S → B(b)D(1)
D(1) → B(b)C
S → B(b)B(b)
B(b) → b
C → B(c)C
B(c) → c
C → c
Type here to search
21°C Clear
ENG
23:05
01-02-2022