Engineer to Excel

SAVEETHA

SCHOOL OF ENGINEERING

COURSE CODE: CSA13

COURSE NAME: Theory of Computation Lab Experiments

Download : http://www.cburch.com/proj/autosim/download.html

C PROGRAMMING:

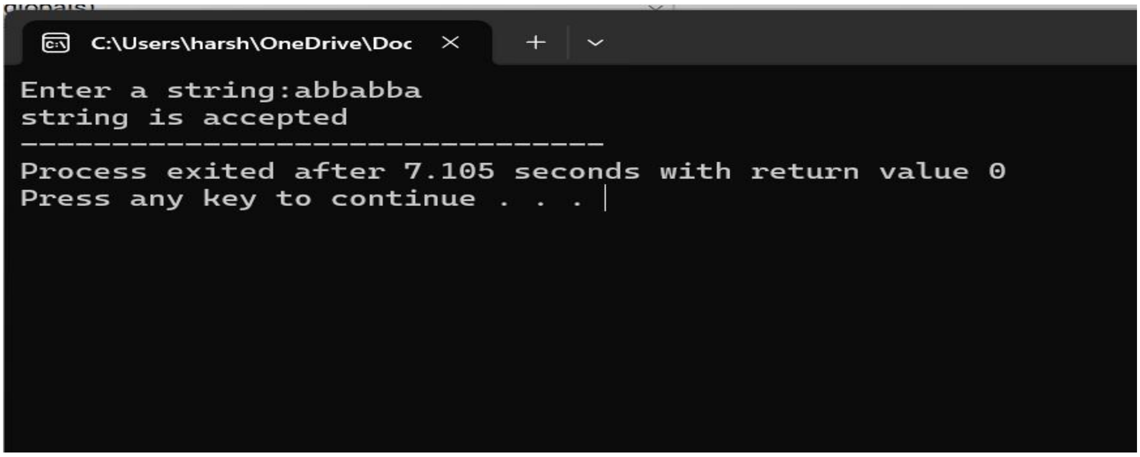
1.Write a C program to simulate a Deterministic Finite Automata (DFA) for the given language representing strings that start with a and end with a.

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] =='a'&&String [strlen (String)-1] =='a')
        {
      int i;
      for (i=0; i<strlen (String); i++) {
         if (String[i]=='0'||String[i]=='1')
                        {
```

```
        printf ("Invalid! \n");
        return 0;
      }
    }
    printf ("string is accepted\n");
  } else {
    printf ("Not Accepted\n");
  }
  return 0;
}
```

OUTPUT:



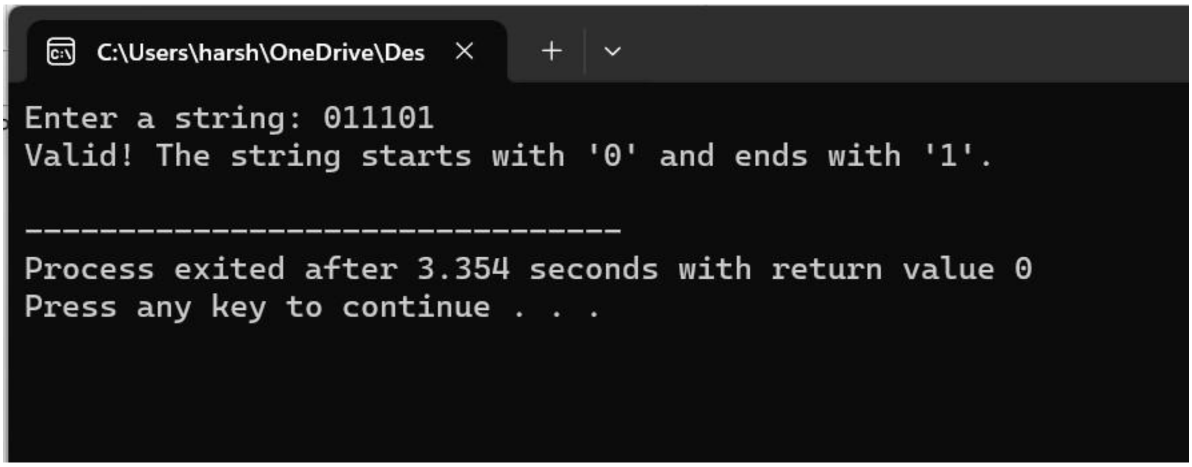
```
Enter a string:abbabba
string is accepted
--------------------------------
Process exited after 7.105 seconds with return value 0
Press any key to continue . . .
```

2. Write a C program to simulate a Deterministic Finite Automata (DFA) for the given language representing strings that start with 0 and end with 1.

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] =='0'&&String [strlen (String)-1] =='1')
        {
      int i;
      for (i==; i<strlen (String); i++) {
         if (String[i]<'0'||String[i]>'1')
                       {
            printf ("Invalid! \n");
            return 0;
         }
      }
      printf ("Valid! The string starts with '0' and ends with '1'.\n");
   } else {
      printf ("Invalid! The string does not start with '0' and end with '1'.\n");
   }
   return 0;
}
```

OUTPUT:



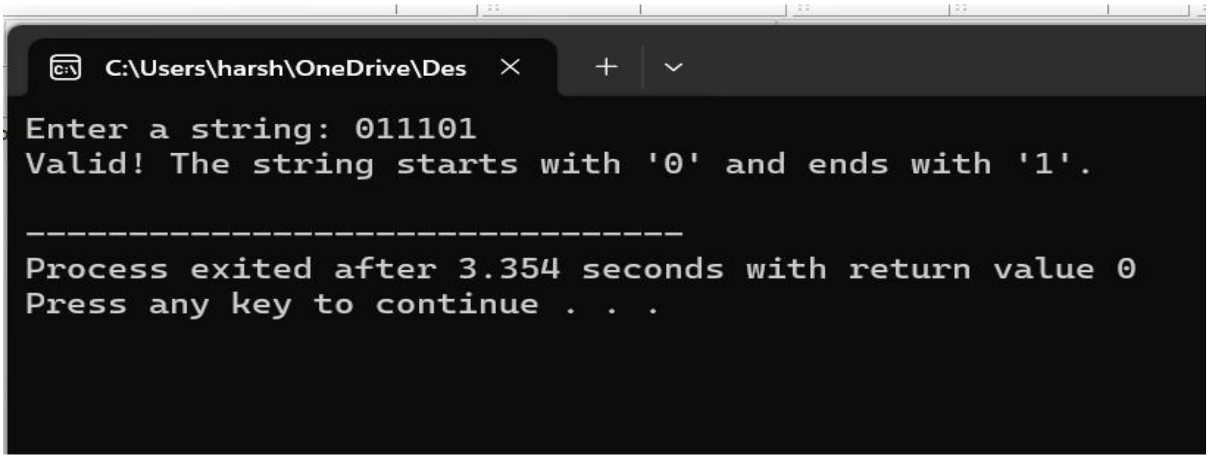
```
Enter a string: 011101
Valid! The string starts with '0' and ends with '1'.

--------------------------------
Process exited after 3.354 seconds with return value 0
Press any key to continue . . .
```

3. Write a C program to check whether a given string belongs to the language defined by a Context Free Grammar (CFG) S → 0A1 A → 0A | 1A | ε

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
  char String [100];
  printf ("Enter a string: ");
  scanf ("%s", String);
  if (String [0] =='0'&&String [strlen (String)-1] =='1')
      {
    int i;
    for (i==; i<strlen (String); i++) {
      if (String[i]<'0'||String[i]>'1')
                  {
        printf ("Invalid! \n");
        return 0;
      }
    }
    printf ("Valid! The string starts with '0' and ends with '1'.\n");
  } else {
    printf ("Invalid! The string does not start with '0' and end with '1'.\n");
  }
  return 0;
}
```

OUTPUT:



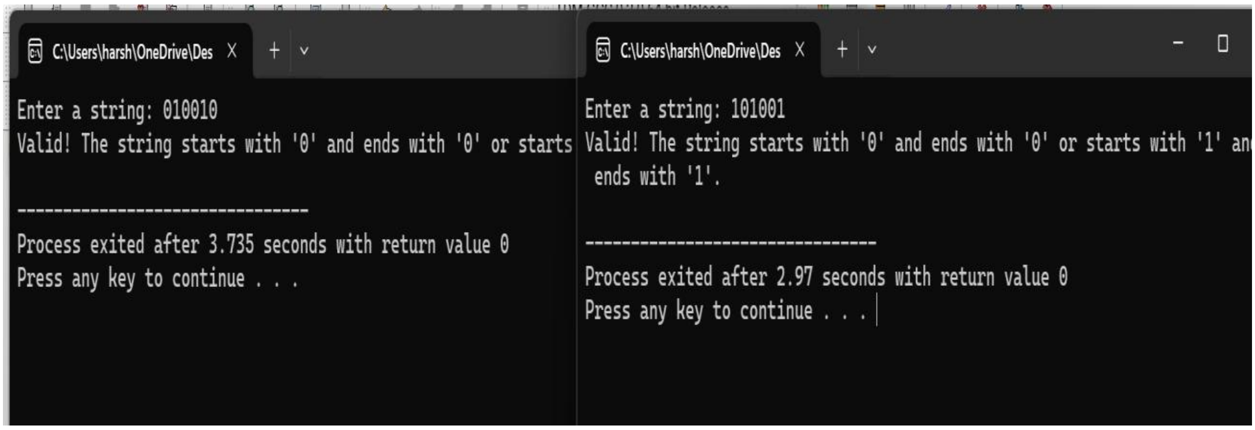
```
Enter a string: 011101
Valid! The string starts with '0' and ends with '1'.

--------------------------------
Process exited after 3.354 seconds with return value 0
Press any key to continue . . .
```

4. Write a C program to check whether a given string belongs to the language defined by a Context Free Grammar (CFG) S → 0S0 | 1S1 | 0 | 1 | ε.

PROGRAM:

```
#include <stdio.h>

#include <string.h>

int main () {

    char String [100];

    printf ("Enter a string: ");

    scanf ("%s", String);

    if (String [0] =='0'&&String [strlen (String)-1] =='1' | | String [0]
=='1'&&String [strlen (String)-1] =='1'))

         {

        int i;

        for (i==; i<strlen (String); i++) {

            if (String[i]<'0'||String[i]>'1')

                                {

                printf ("Invalid! \n");

                return 0;

            }

        }

        printf ("Valid! The string starts with '0' and ends with '0' or starts with '1'
and ends with '1'.\n");

    } else {

        printf ("Invalid! The string starts with '0' and ends with '0' or starts with '1'
and ends with '1'.\n");

    }
    return 0;
}
```

OUTPUT:



```
Enter a string: 010010
Valid! The string starts with '0' and ends with '0' or starts

--------------------------------
Process exited after 3.735 seconds with return value 0
Press any key to continue . . .
```

```
Enter a string: 101001
Valid! The string starts with '0' and ends with '0' or starts with '1' an
 ends with '1'.

--------------------------------
Process exited after 2.97 seconds with return value 0
Press any key to continue . . .
```

5. Write a C program to check whether a given string belongs to the language defined by a Context Free Grammar (CFG) S → 0S0 | A

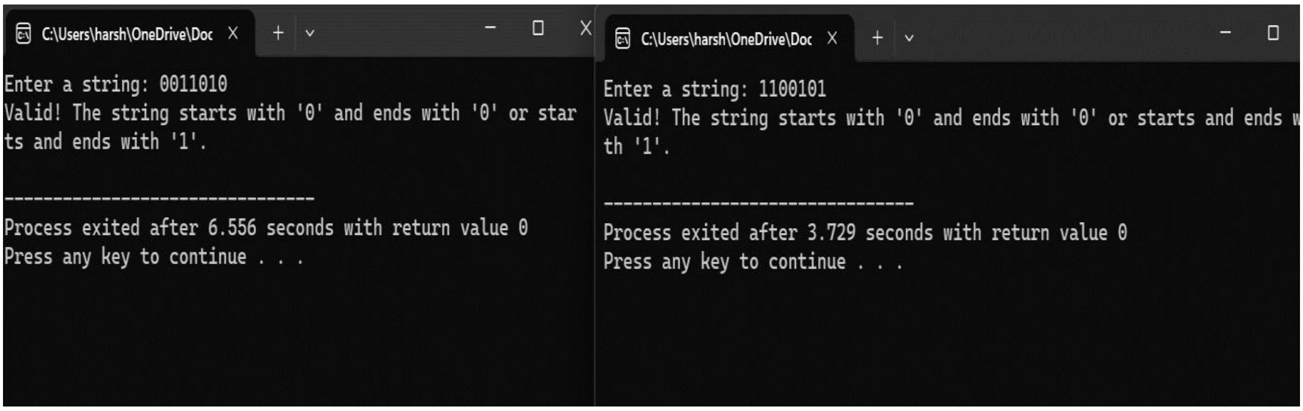
A → 1A | ε

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] =='0'&&String [strlen (String)-1] =='1' | | String [0]
=='1'&&String [strlen (String)-1] =='1'))
        {
      int i;
      for (i==; i<strlen (String); i++) {
         if (String[i]<'0'||String[i]>'1')
                        {
            printf ("Invalid! \n");
            return 0;
         }
      }
      printf ("Valid! The string starts with '0' and ends with '0' or starts with '1'
and ends with '1'.\n");
   } else {
      printf ("Invalid! The string starts with '0' and ends with '0' or starts with '1'
and ends with '1'.\n");
   }
```

```
    return 0;
}
```

OUTPUT:



```
Enter a string: 0011010
Valid! The string starts with '0' and ends with '0' or star
ts and ends with '1'.

--------------------------------
Process exited after 6.556 seconds with return value 0
Press any key to continue . . .
```

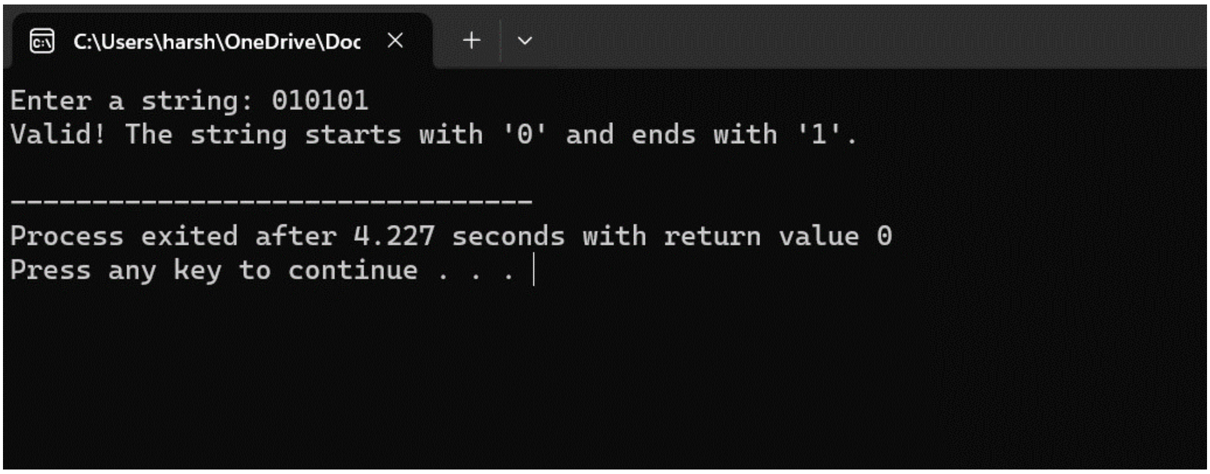
```
Enter a string: 1100101
Valid! The string starts with '0' and ends with '0' or starts and ends w
th '1'.

--------------------------------
Process exited after 3.729 seconds with return value 0
Press any key to continue . . .
```

6. Write a C program to check whether a given string belongs to the language defined by a Context Free Grammar (CFG) S → 0S1 | ε

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] =='0'&&String [strlen (String)-1] =='1')
         {
      int i;
      for (i==; i<strlen (String); i++) {
         if (String[i]<'0'||String[i]>'1')
                        {
            printf ("Invalid! \n");
            return 0;
         }
      }
      printf ("Valid! The string starts with '0' and ends with '1'.\n");
   } else {
      printf ("Invalid! The string does not start with '0' and end with '1'.\n");
   }
   return 0;
```

OUTPUT:



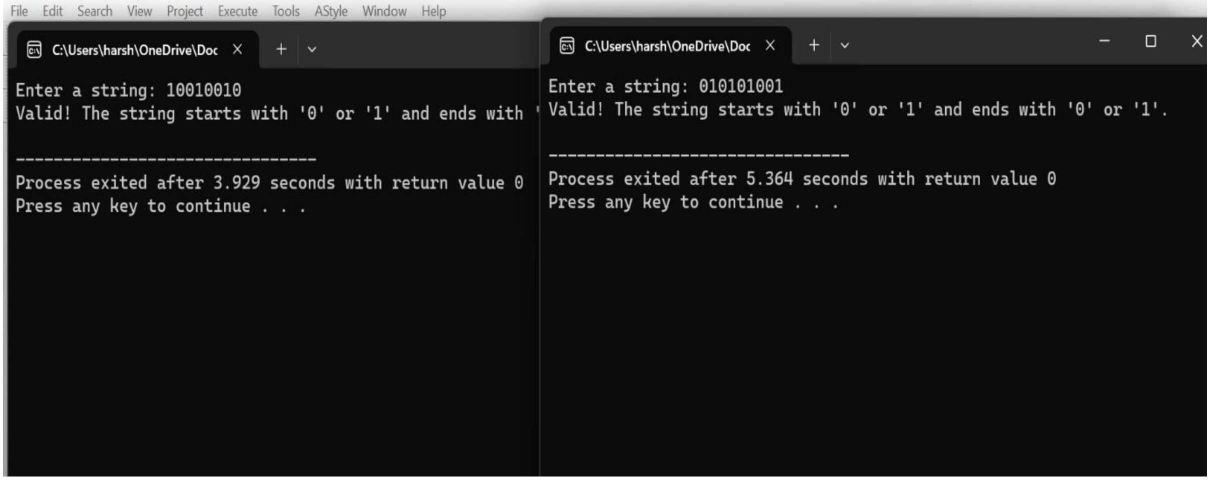
```
Enter a string: 010101
Valid! The string starts with '0' and ends with '1'.

--------------------------------
Process exited after 4.227 seconds with return value 0
Press any key to continue . . .
```

7. Write a C program to check whether a given string belongs to the language defined by a Context Free Grammar (CFG) S → A101A, A → 0A | 1A | ε

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] ==’0’ || ‘1’ &&String [strlen (String)-1] ==’0’ || ‘1’)
        {
      int i;
      for (i==; i<strlen (String); i++) {
         if (String[i]<'0'||String[i]>'1')
                         {
            printf ("Invalid! \n");
            return 0;
         }
      }
      printf ("Valid! The string starts with '0' or '1' and ends with '0' or '1'.\n");
   } else {
      printf ("Invalid! The string does not start with '0' or '1' and end with '0' or
'1'.\n");
   }
   return 0;
}
```

OUTPUT:



File Edit Search View Project Execute Tools AStyle Window Help
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C:\Users\harsh\OneDrive\Doc

```
Enter a string: 10010010
Valid! The string starts with '0' or '1' and ends with '

--------------------------------
Process exited after 3.929 seconds with return value 0
Press any key to continue . . .
```

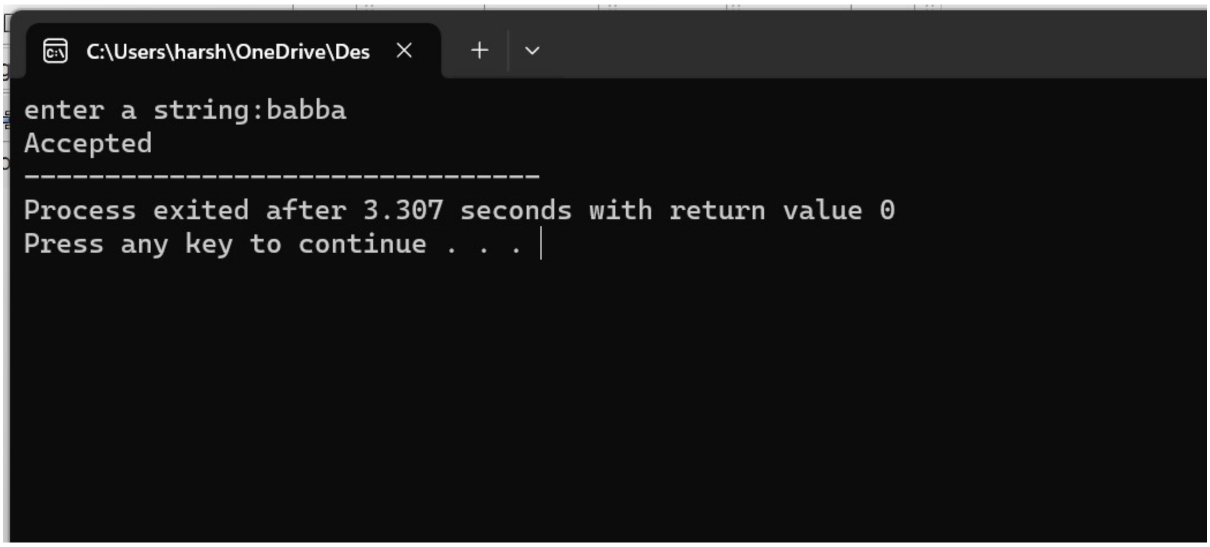
```
Enter a string: 010101001
Valid! The string starts with '0' or '1' and ends with '0' or '1'.

--------------------------------
Process exited after 5.364 seconds with return value 0
Press any key to continue . . .
```

8. Write a C program to simulate a Non-Deterministic Finite Automata (NFA) for the given language representing strings that start with b and end with a.

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] =='a'&&String [strlen (String)-1] =='a')
         {
      int i;
      for (i=0; i<strlen (String); i++) {
         if (String[i]=='0'||String[i]=='1')
                        {
            printf ("Invalid! \n");
            return 0;
         }
      }
      printf ("Accepted\n");
   } else {
      printf ("Not Accepted\n");
   }
   return 0;
}
```

OUTPUT:



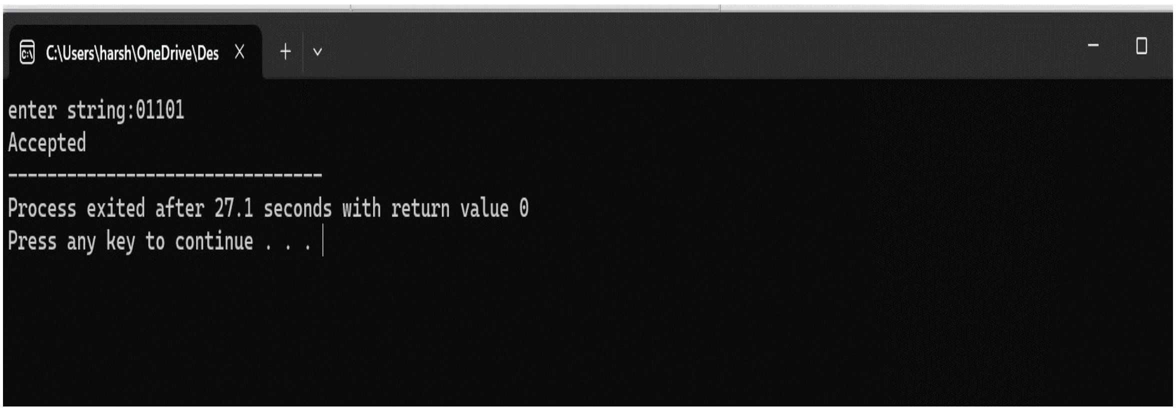
```
enter a string:babba
Accepted
--------------------------------
Process exited after 3.307 seconds with return value 0
Press any key to continue . . .
```

9. Write a C program to simulate a Non-Deterministic Finite Automata (NFA) for the given language representing strings that start with o and end with 1.

PROGRAM:

```
#include <stdio.h>
#include <string.h>
int main () {
   char String [100];
   printf ("Enter a string: ");
   scanf ("%s", String);
   if (String [0] =='0'&&String [strlen (String)-1] =='1')
        {
      int i;
      for (i==; i<strlen (String); i++) {
         if (String[i]<'0'||String[i]>'1')
                         {
            printf ("Invalid! \n");
            return 0;
         }
      }
      printf ("Valid! The string starts with '0' and ends with '1'.\n");
   } else {
      printf ("Invalid! The string does not start with '0' and end with '1'.\n");
   }
   return 0;
}
```

OUTPUT:



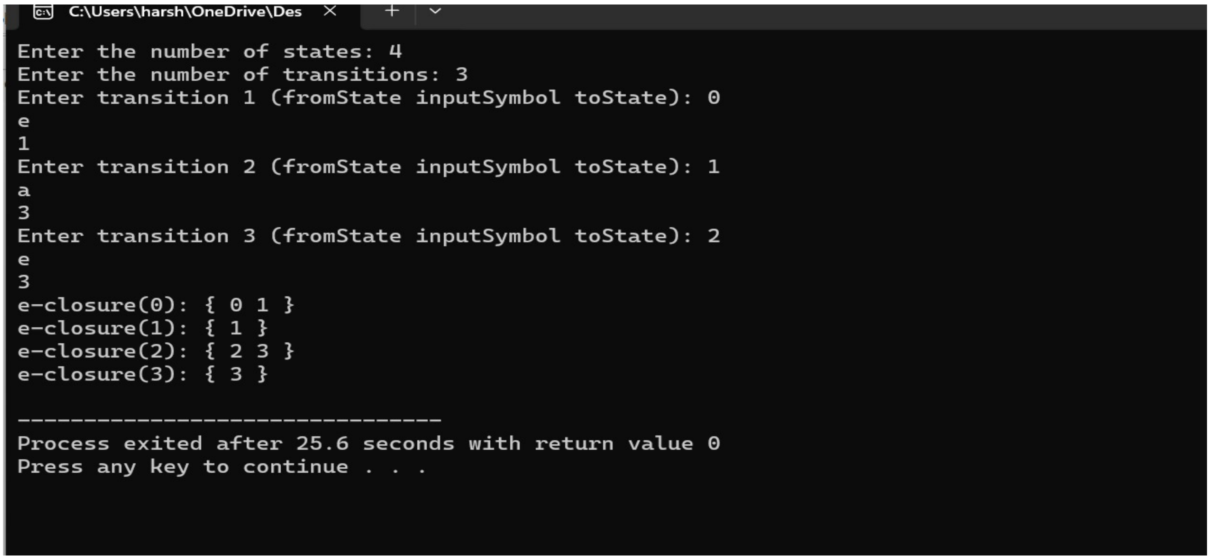
```
enter string:01101
Accepted
--------------------------------
Process exited after 27.1 seconds with return value 0
Press any key to continue . . .
```

10. Write a C program to find ε -closure for all the states in a Non-Deterministic Finite Automata (NFA) with ε -moves.

PROGRAM:

```
#include <stdio.h>
int main () {
    int n;
    int m;
    printf ("Enter the number of states: ");
    scanf ("%d", &n);
    printf ("Enter the number of transitions: ");
    scanf ("%d", &m);
    int transitions [3][3];
    for (int i = 0; i < m; i++) {
        printf ("Enter transition %d (fromState inputSymbol toState): ", i
+ 1);
        scanf ("%d", &transitions[i][0]);
        char inputSymbol [2];
        scanf ("%1s", inputSymbol);
        scanf ("%d", &transitions[i][2]);
        if (inputSymbol [0] == 'e') {
            transitions[i][1] = 'e';
        } else {
            transitions[i][1] = inputSymbol [0];
        }
    }
    for (int i = 0; i < n; i++) {
        printf("e-closure(%d): {%d ", i, i);
        for (int j = 0; j < m; j++) {
            if (transitions[j][0] == i && transitions[j][1] == 'e') {
                printf ("%d ", transitions[j][2]);
            }
        }
        printf (“} \n”);
    }
    return 0;
}
```

OUTPUT:



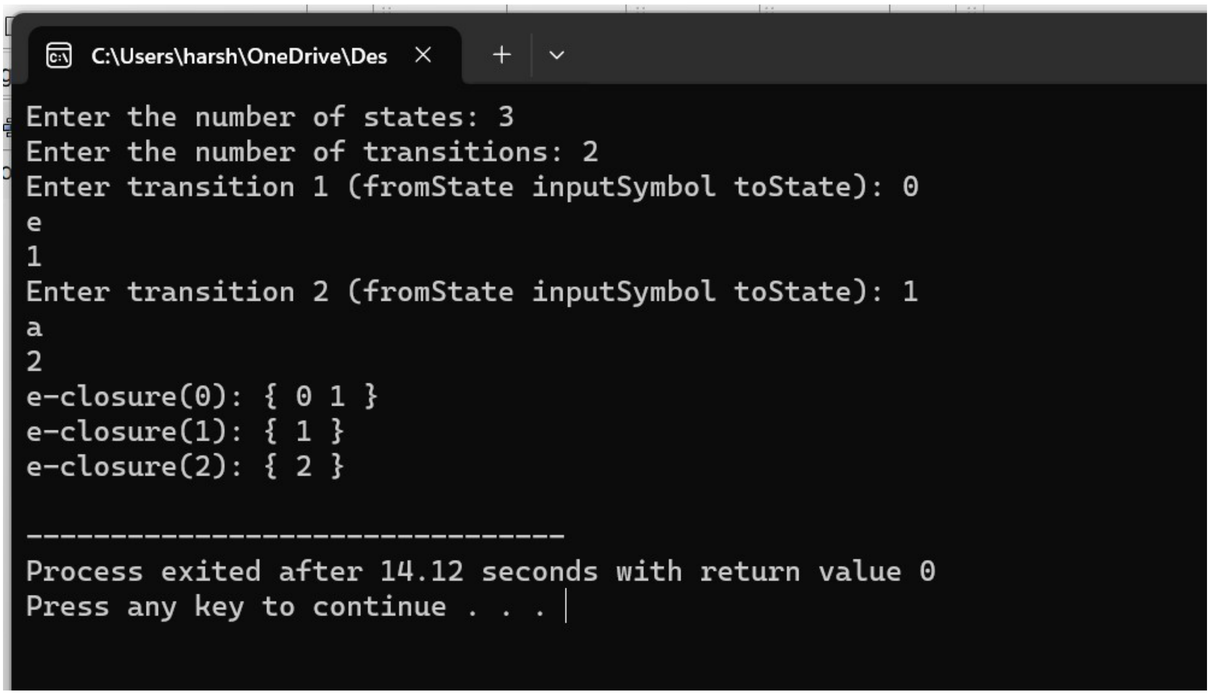
```
Enter the number of states: 4
Enter the number of transitions: 3
Enter transition 1 (fromState inputSymbol toState): 0
e
1
Enter transition 2 (fromState inputSymbol toState): 1
a
3
Enter transition 3 (fromState inputSymbol toState): 2
e
3
e-closure(0): { 0 1 }
e-closure(1): { 1 }
e-closure(2): { 2 3 }
e-closure(3): { 3 }

--------------------------------
Process exited after 25.6 seconds with return value 0
Press any key to continue . . .
```

11. Write a C program to find ε -closure for all the states in a Non-Deterministic Finite Automata (NFA) with ε -moves.

PROGRAM:

```
#include <stdio.h>
int main () {
    int n;
    int m;
    printf ("Enter the number of states: ");
    scanf ("%d", &n);
    printf ("Enter the number of transitions: ");
    scanf ("%d", &m);
    int transitions [3][3];
    for (int i = 0; i < m; i++) {
        printf ("Enter transition %d (fromState inputSymbol toState): ", i + 1);
        scanf ("%d", &transitions[i][0]);
        char inputSymbol [2];
        scanf ("%1s", inputSymbol);
        scanf ("%d", &transitions[i][2]);
        if (inputSymbol [0] == 'e') {
            transitions[i][1] = 'e';
        } else {
            transitions[i][1] = inputSymbol [0];
        }
    }
    for (int i = 0; i < n; i++) {
        printf("e-closure(%d): {%d ", i, i);
        for (int j = 0; j < m; j++) {
            if (transitions[j][0] == i && transitions[j][1] == 'e') {
                printf ("%d ", transitions[j][2]);
            }
        }
        printf (“} \n”);
    }
    return 0;
}
```

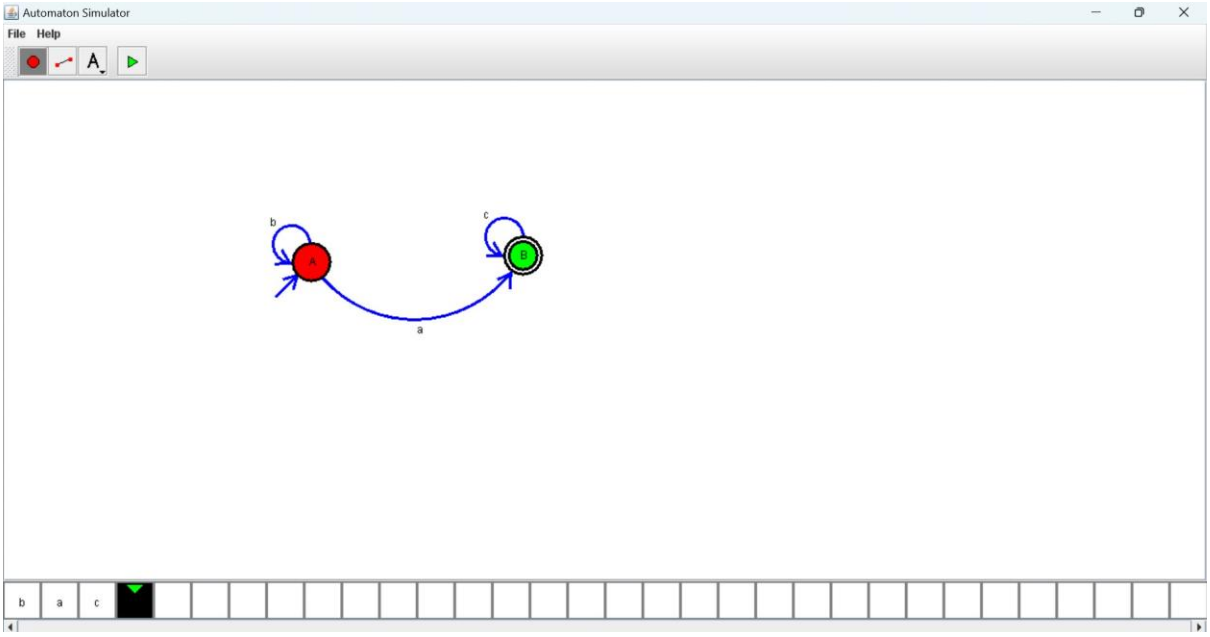
OUTPUT:



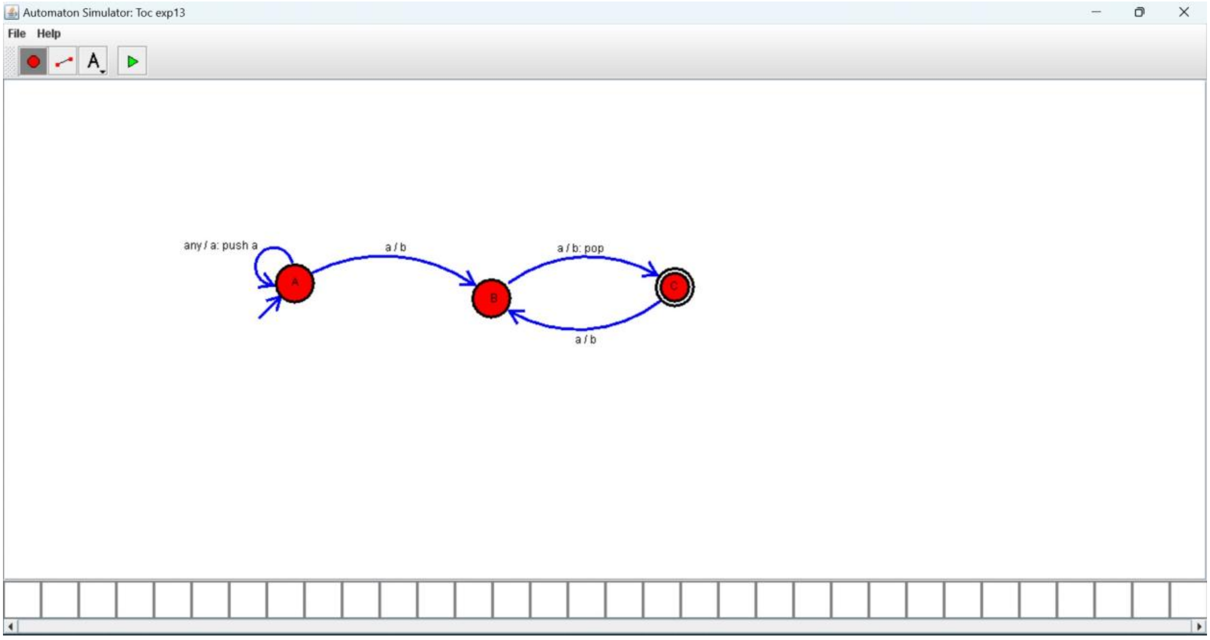
```
Enter the number of states: 3
Enter the number of transitions: 2
Enter transition 1 (fromState inputSymbol toState): 0
e
1
Enter transition 2 (fromState inputSymbol toState): 1
a
2
e-closure(0): { 0 1 }
e-closure(1): { 1 }
e-closure(2): { 2 }

--------------------------------
Process exited after 14.12 seconds with return value 0
Press any key to continue . . .
```

AUTO SIM Programs:

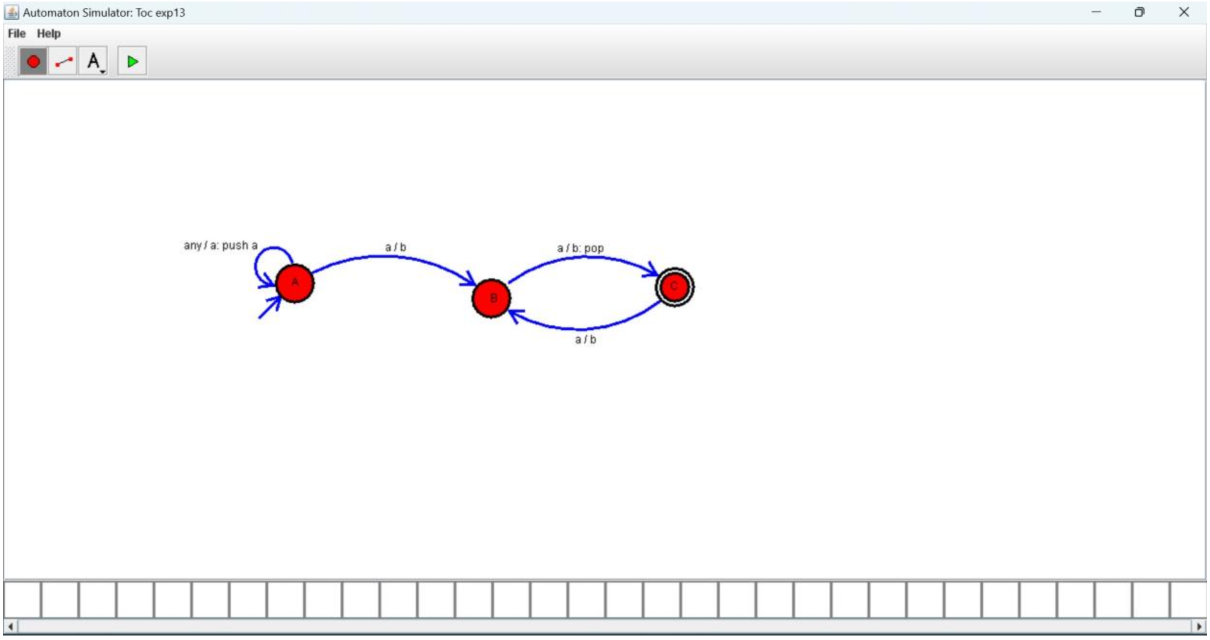
12. Design DFA using simulator to accept the input string “a”, “a” and” bac”



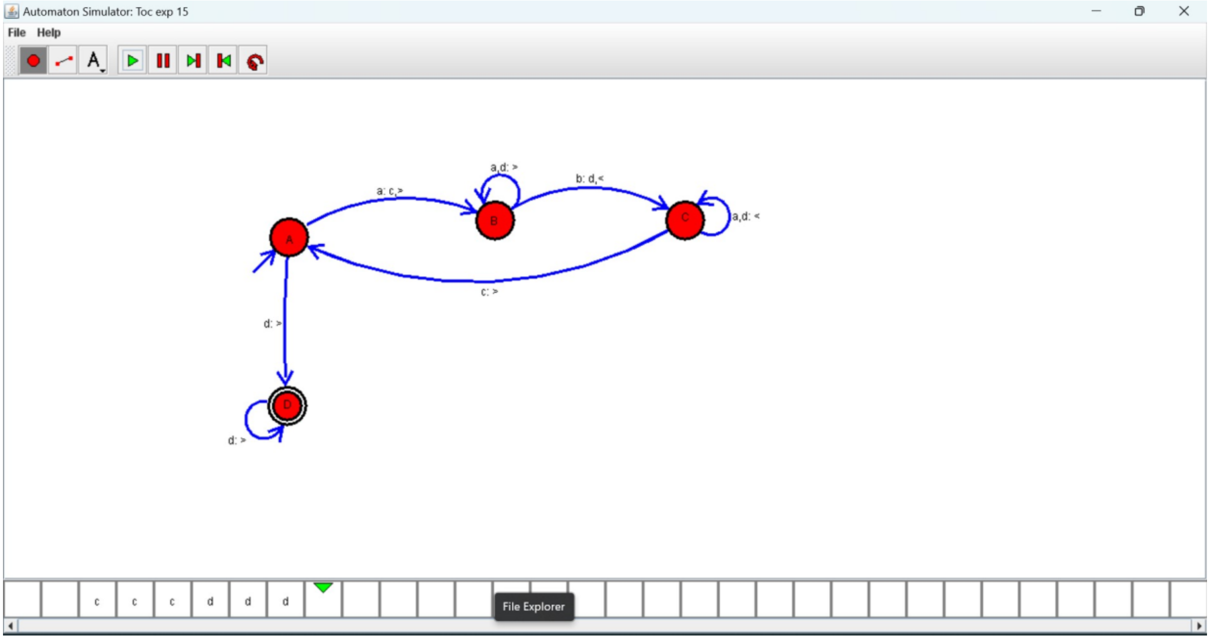
13. Design PDA using simulator to accept the input string aabb



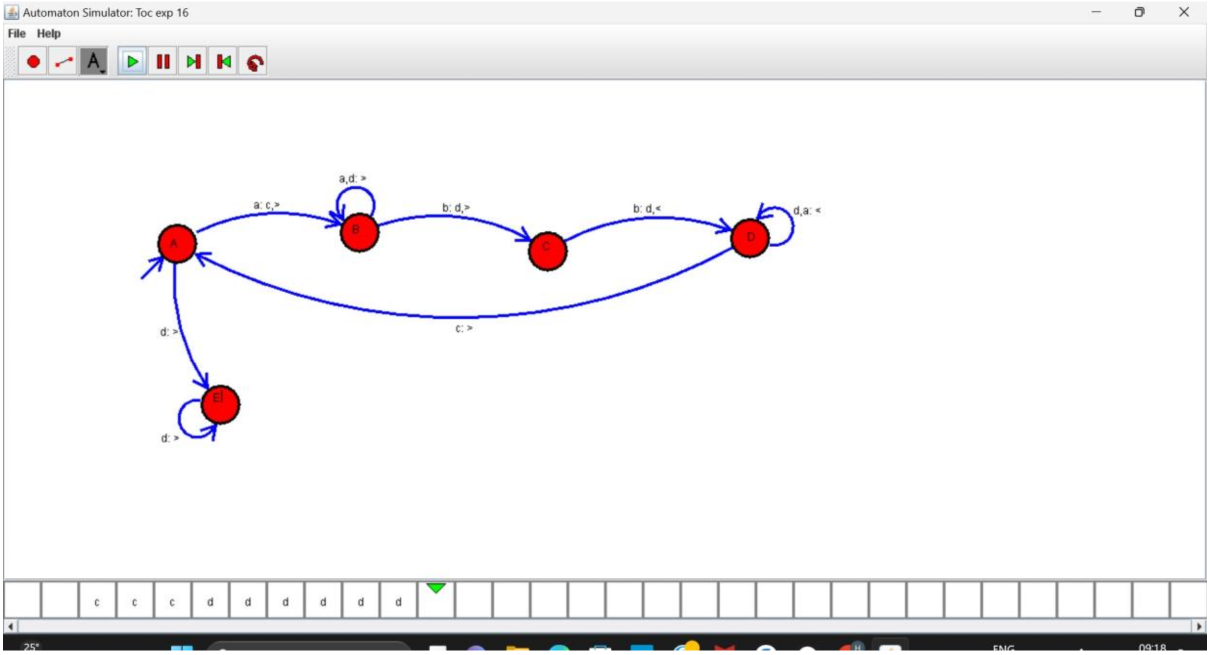
14. Design PDA using simulator to accept the input string a^nb^2n



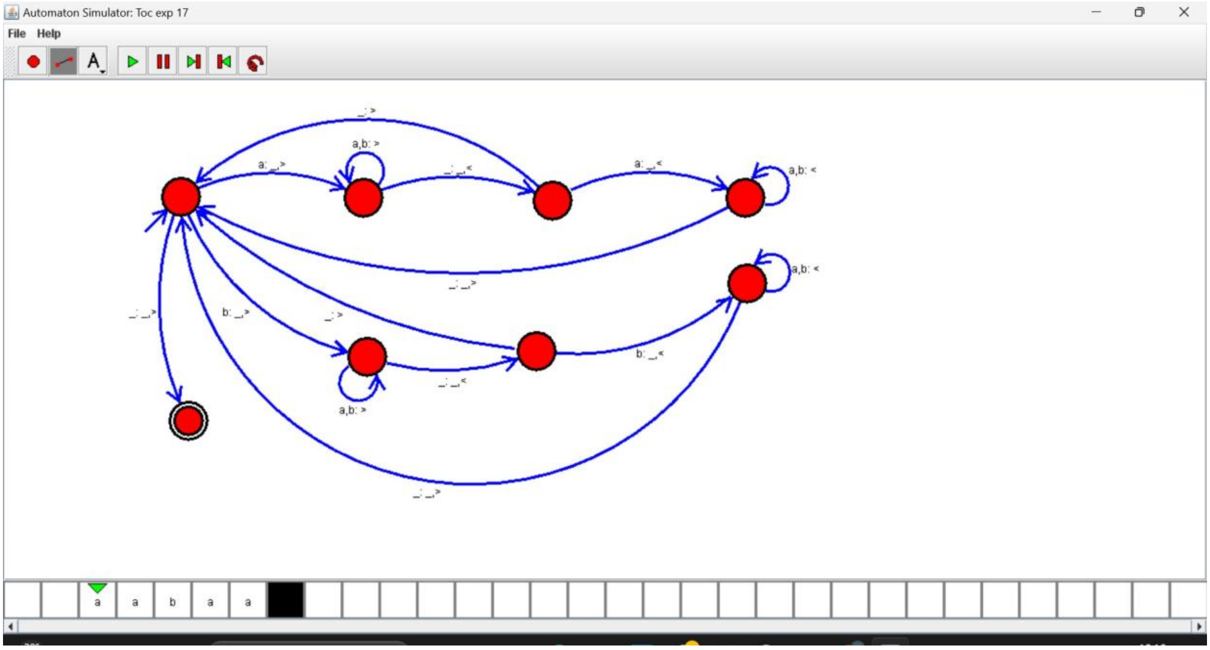
15. Design TM using simulator to accept the input string a ^nb^ n



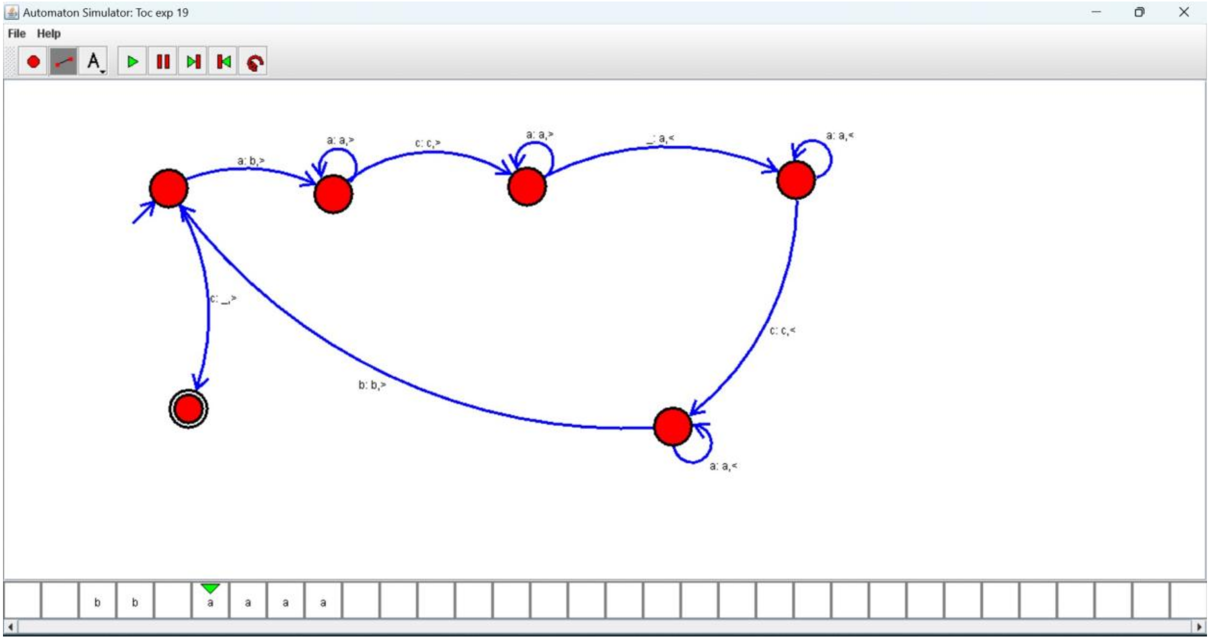
16. Design TM using simulator to accept the input string a^nb^2n



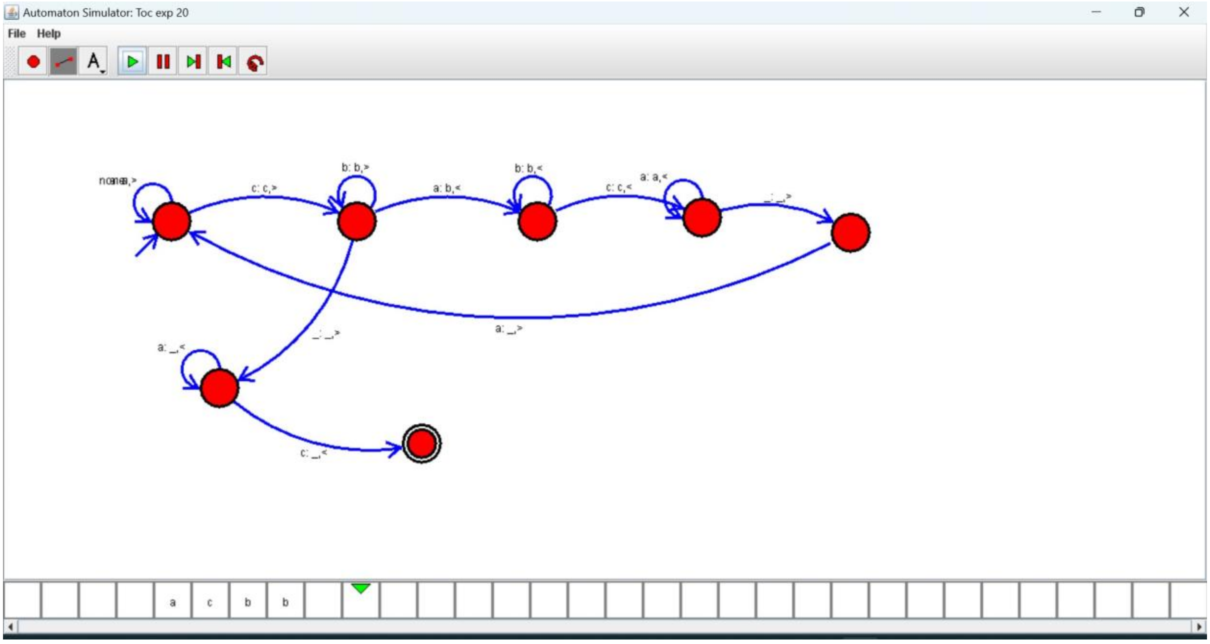
17. Design TM using simulator to accept the input string Palindrome ababa



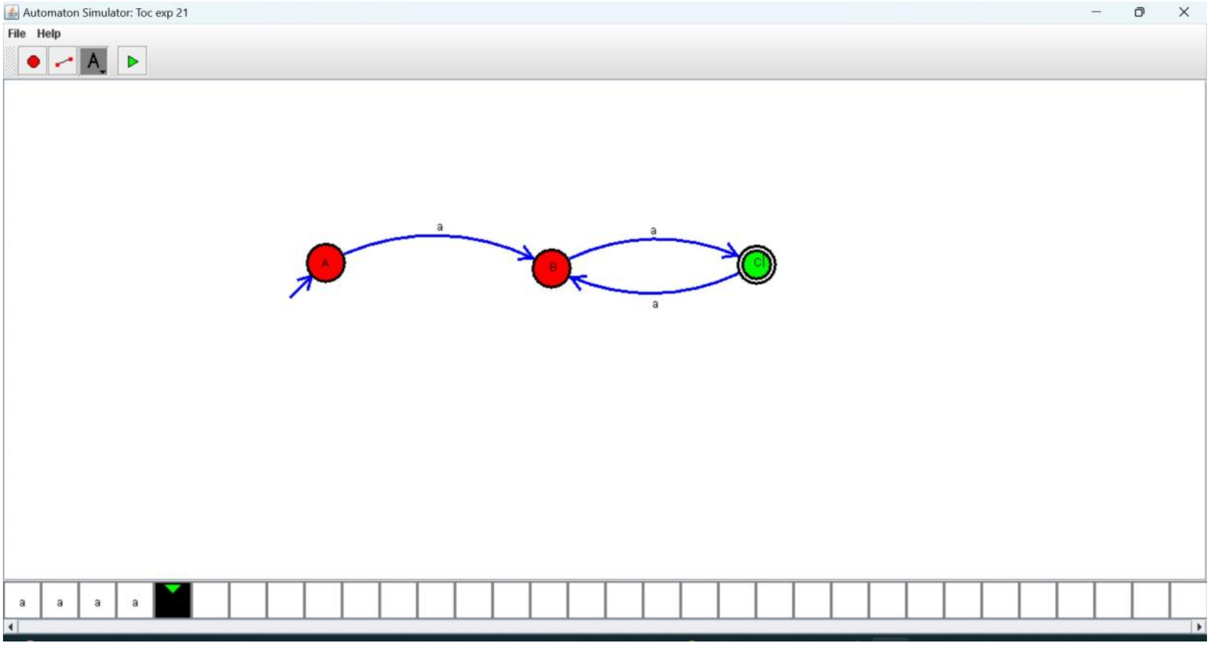
19. Design TM using simulator to perform addition of ‘aa’ and ‘aaa’



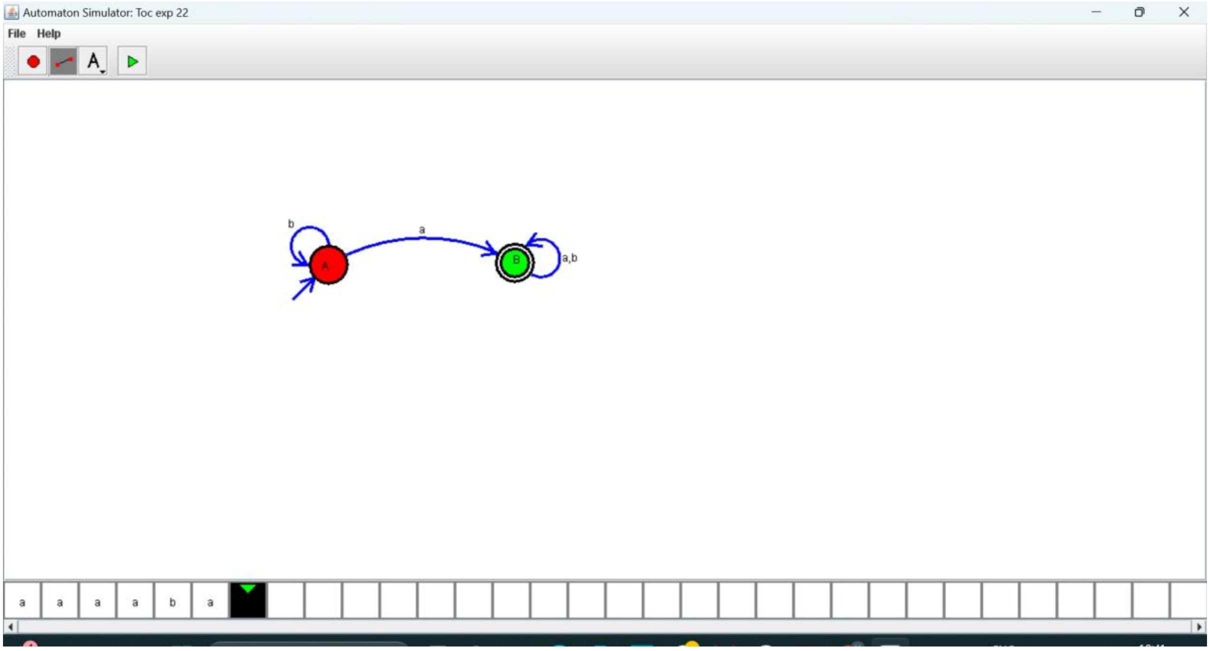
20. Design TM using simulator to perform subtraction of aaa-aa



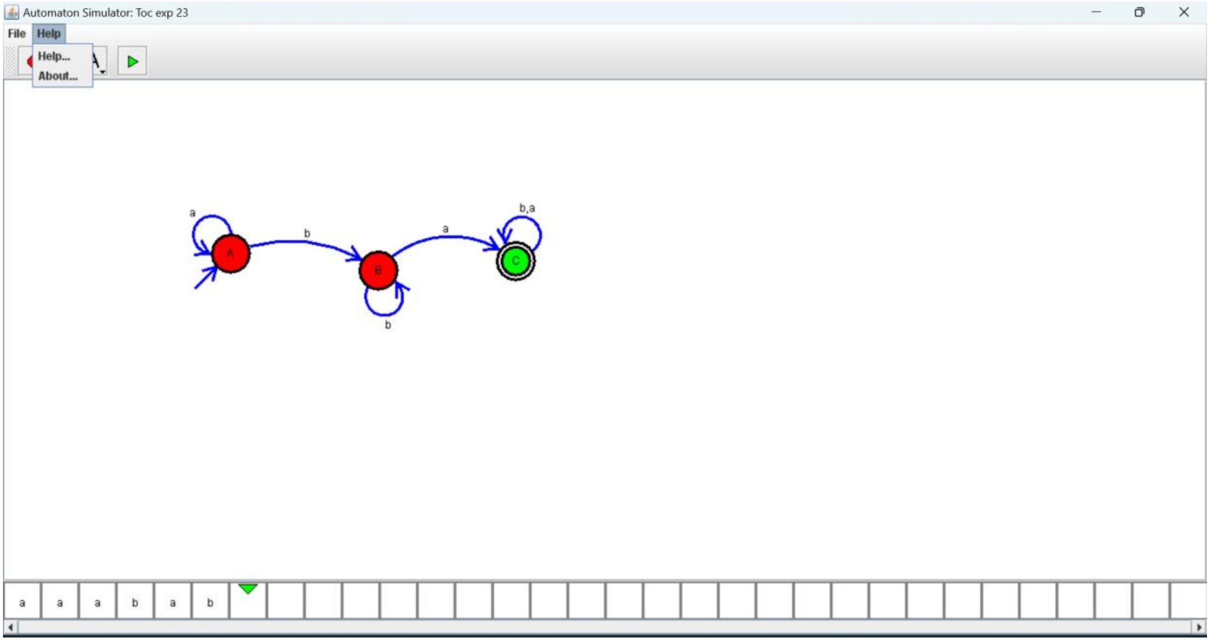
21. Design DFA using simulator to accept even number of a’s.



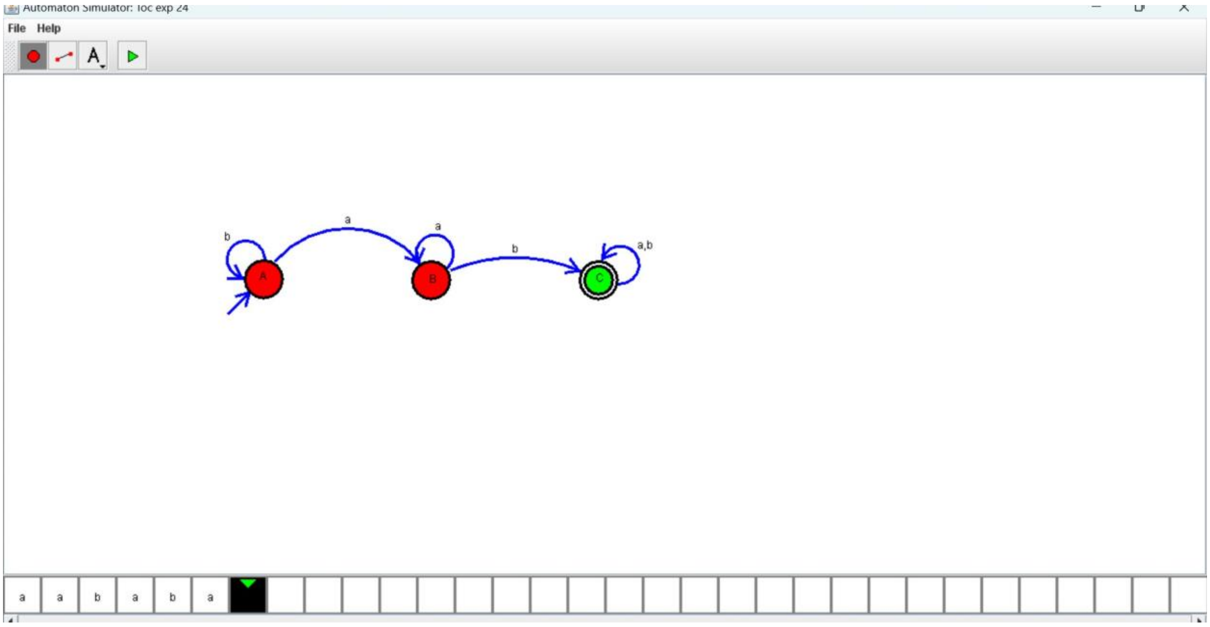
22. Design DFA using simulator to accept odd number of a’s



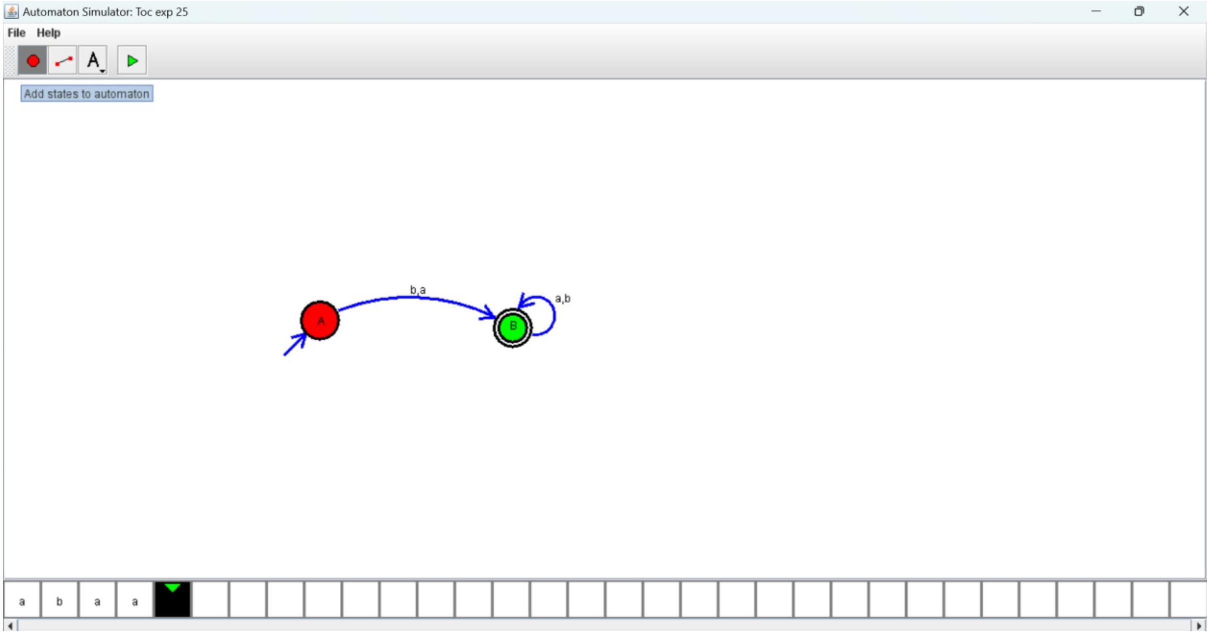
23. Design DFA using simulator to accept the string the end with ab over set {a, b)} w= aaabab



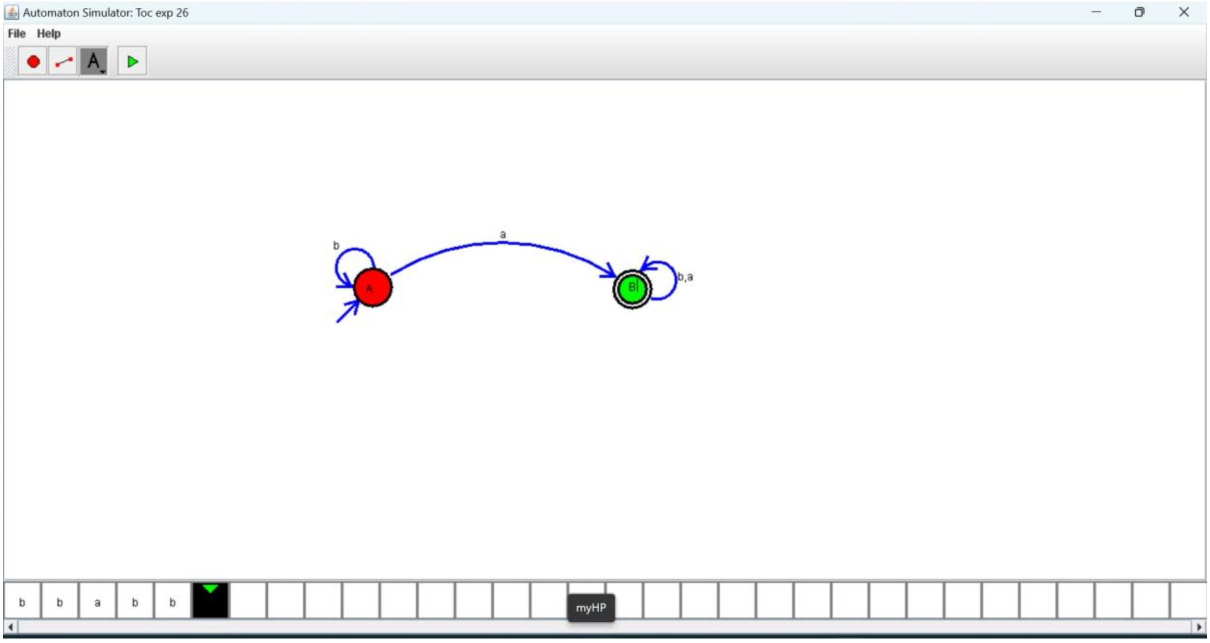
24. Design DFA using simulator to accept the string having ‘ab’ as substring over the set {a,b}



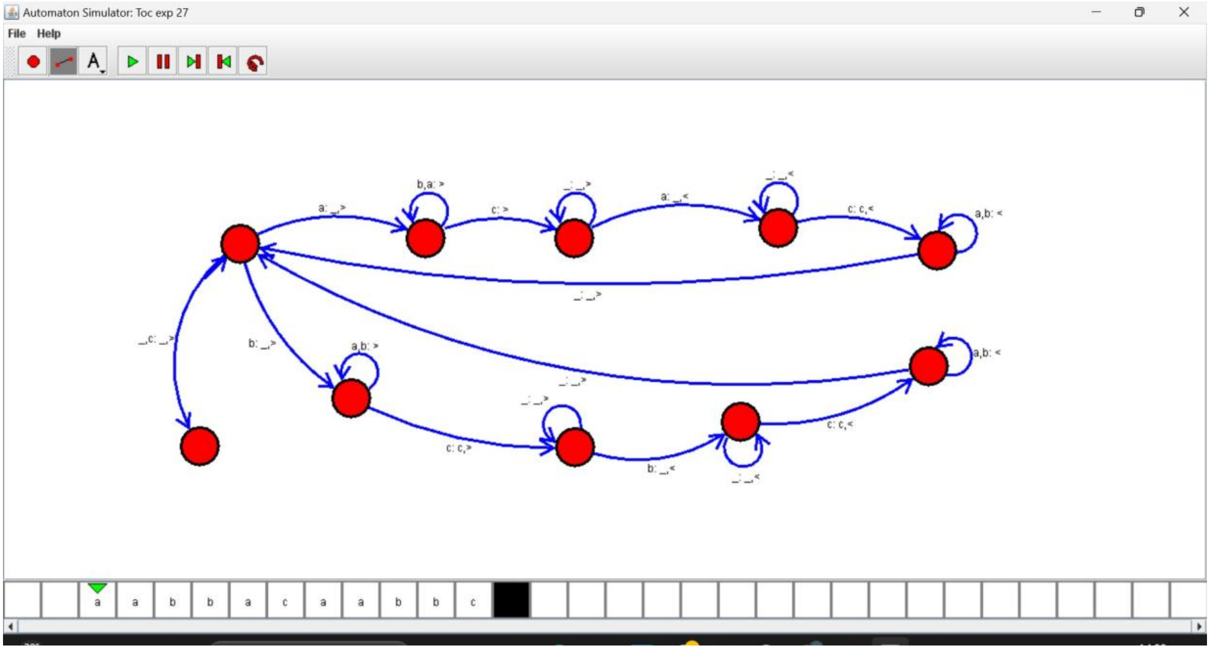
25. Design DFA using simulator to accept the string start with a or b over the set {a, b}



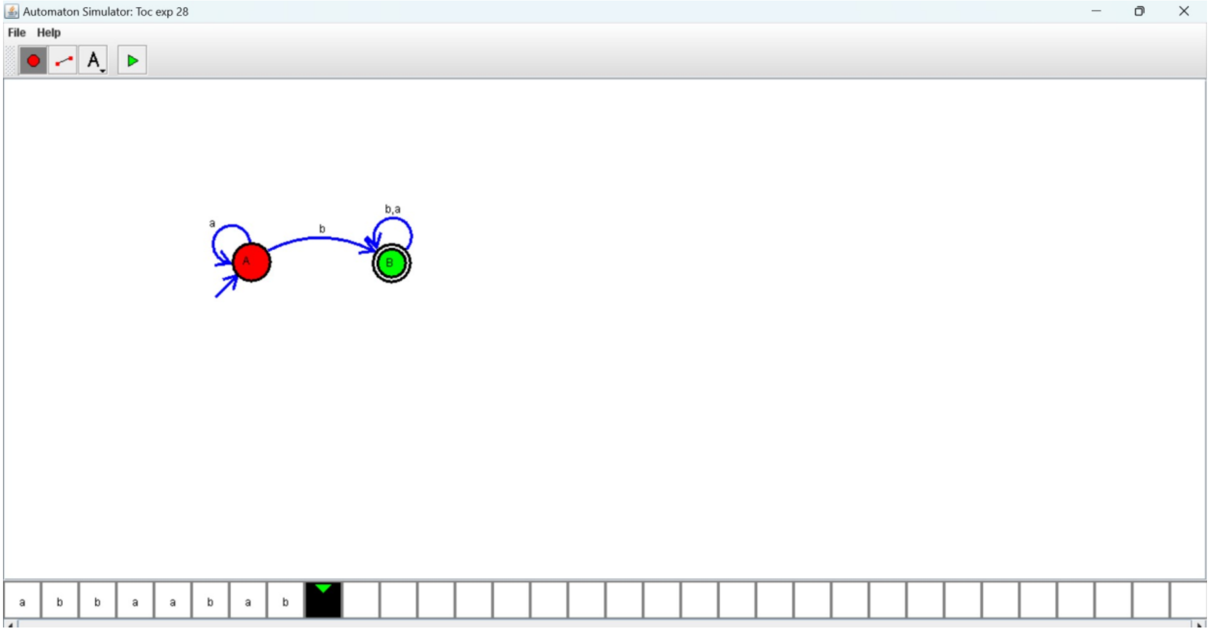
26. Design TM using simulator to accept the input string Palindrome bbabb



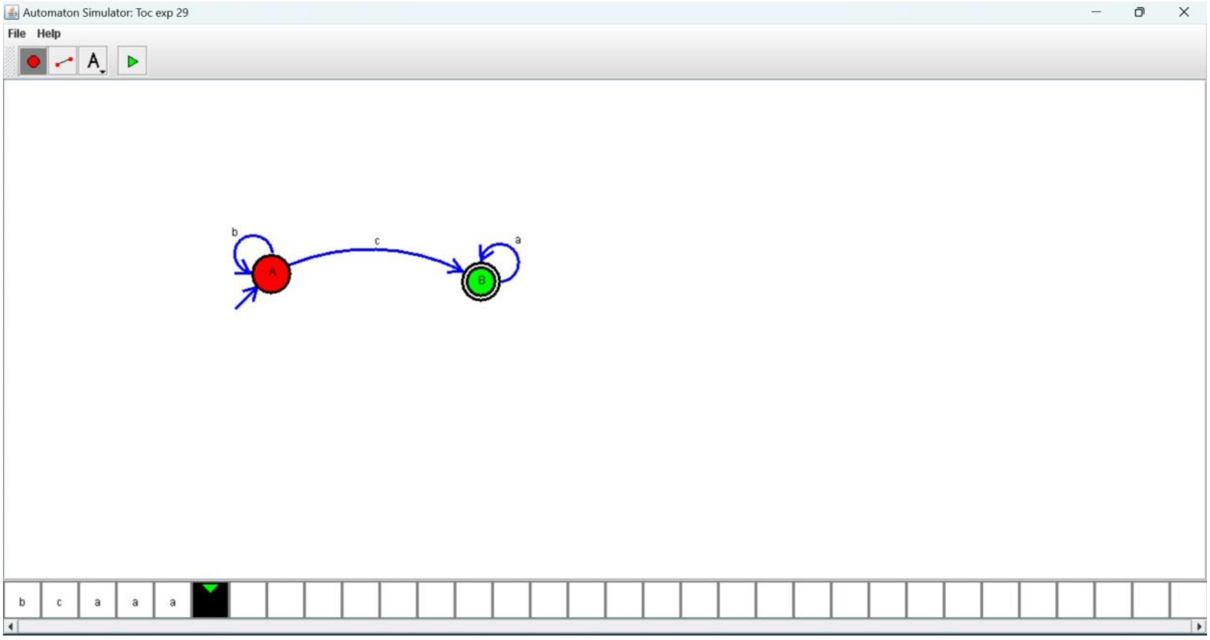
27. Design TM using simulator to accept the input string wcw



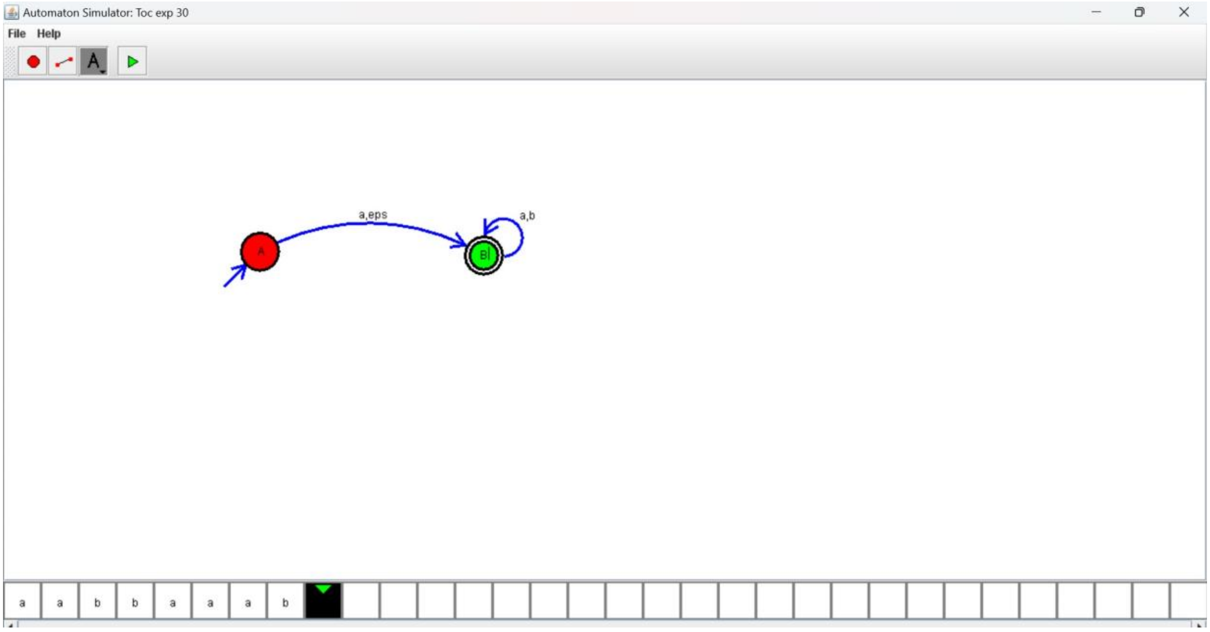
28. Design DFA using simulator to accept the string the end with ab over set {a, b) W= abbaabab



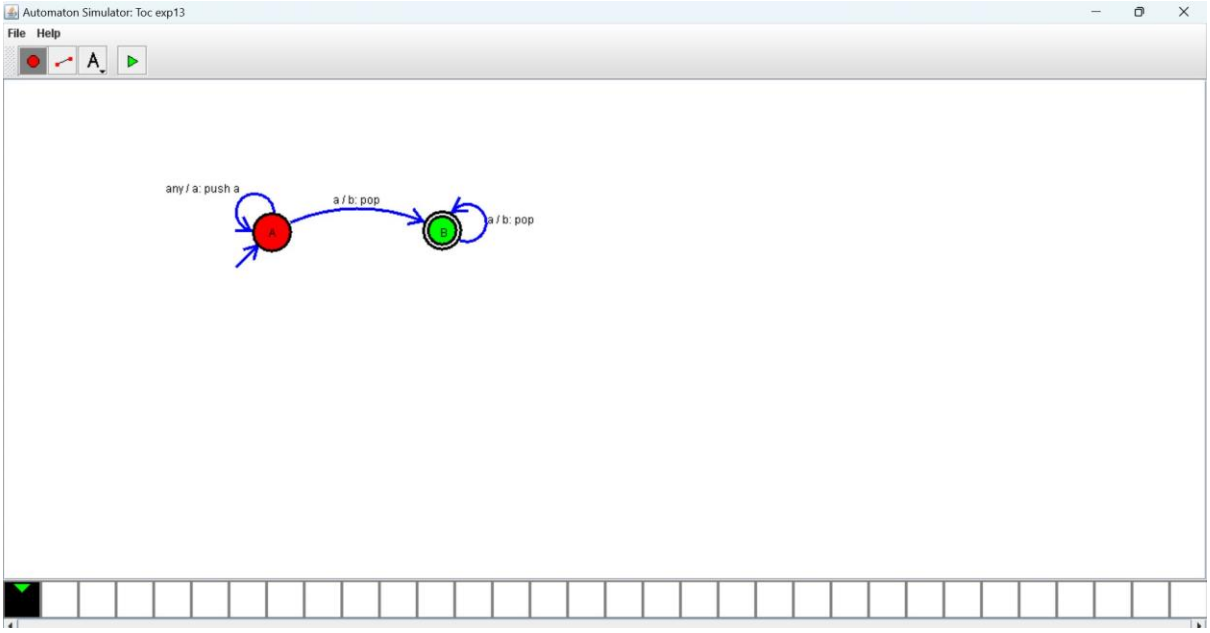
29. Design DFA using simulator to accept the input string “bc”,” c”, and” bcaaa”.



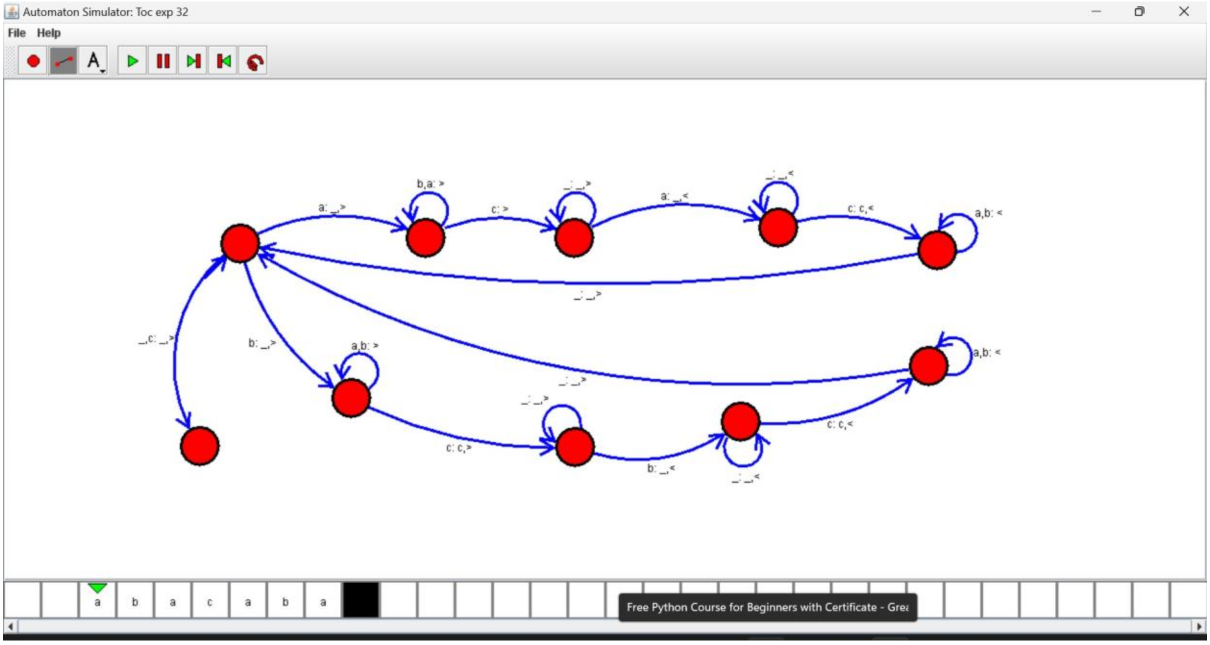
30. Design NFA to accept any number of a’s where input = {a, b}.



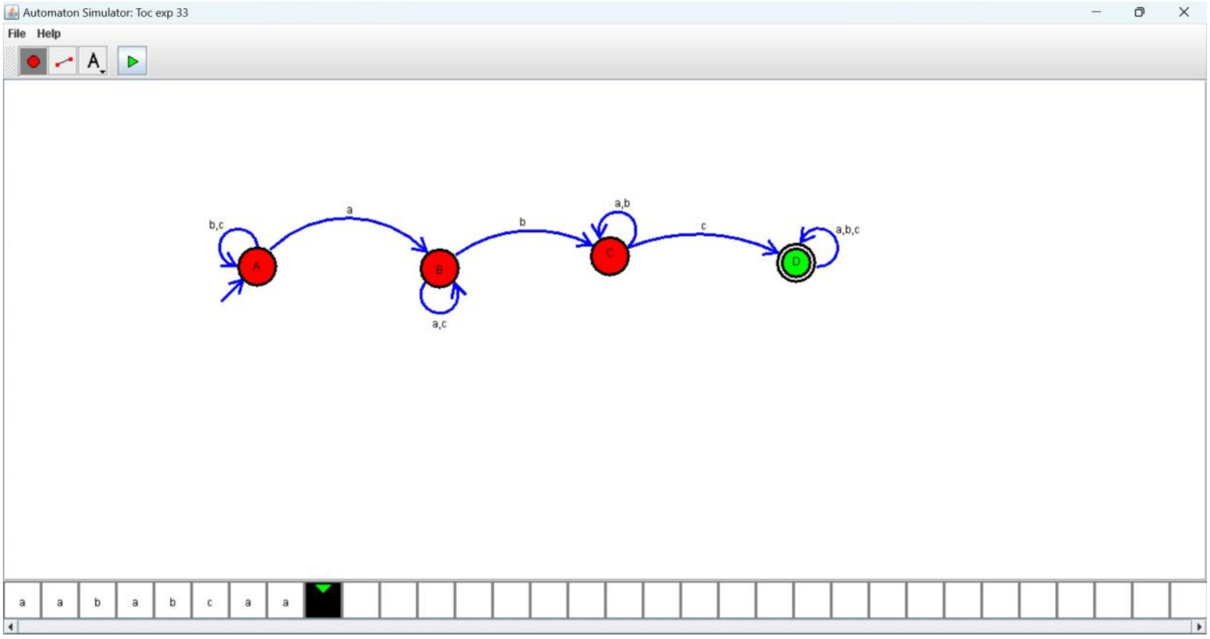
31. Design PDA using simulator to accept the input string a^nb^n



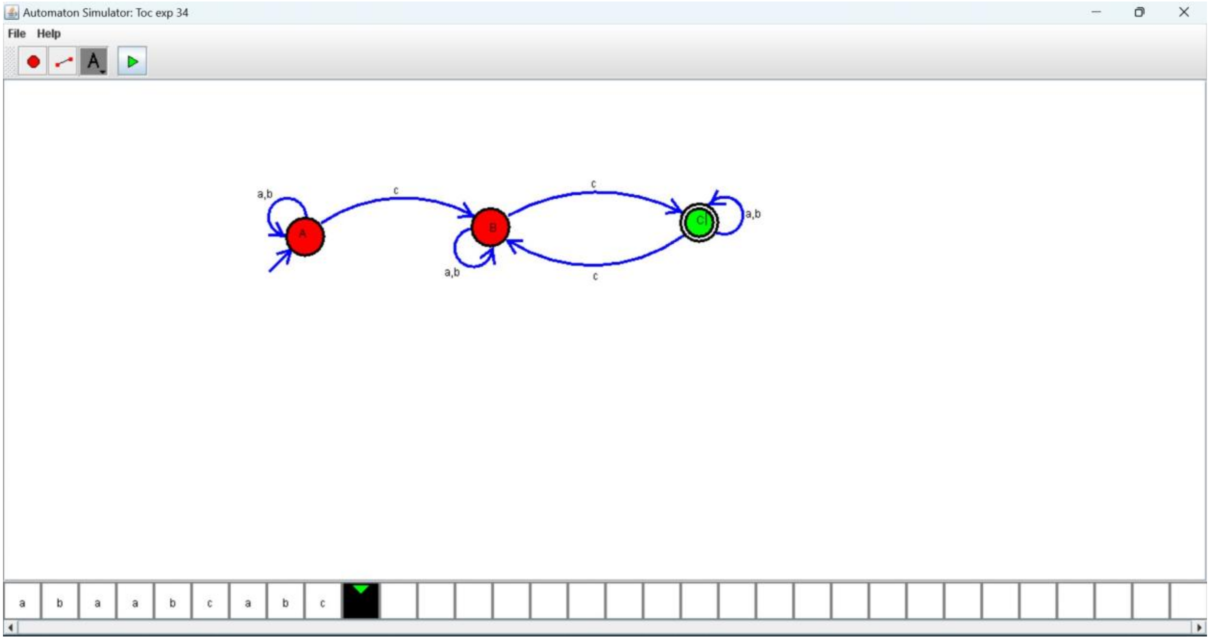
32. Design TM using simulator to perform string comparison where w = {aba aba}



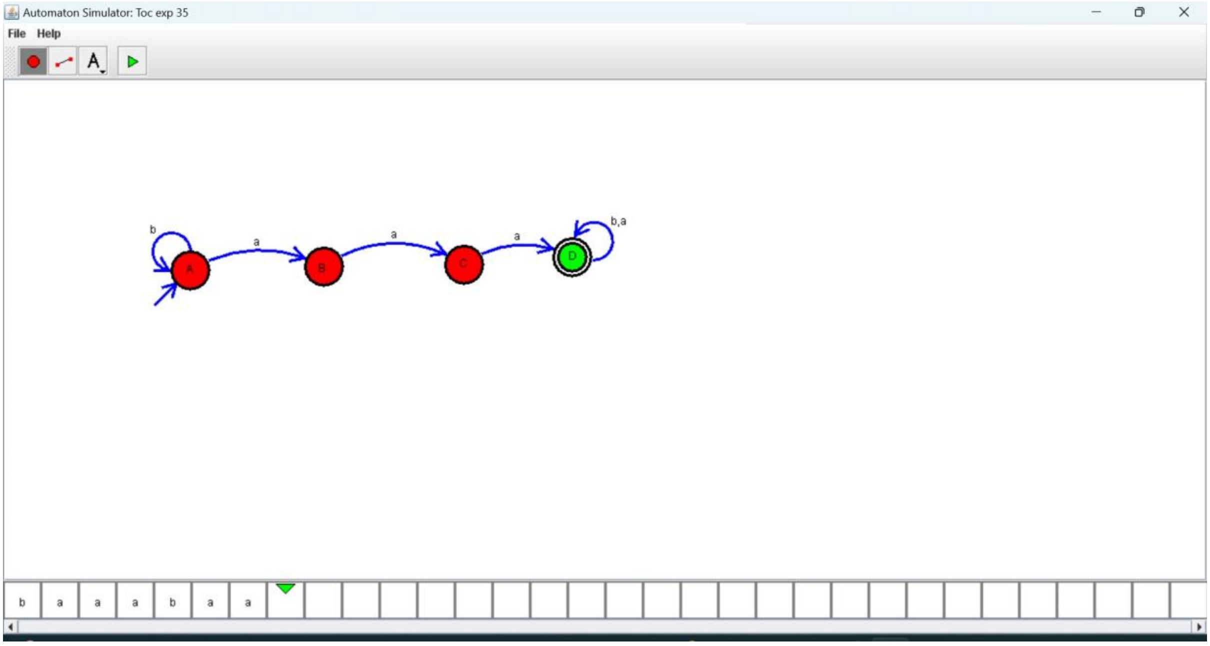
33. Design DFA using simulator to accept the string having ‘abc’ as substring over the set {a, b, c}



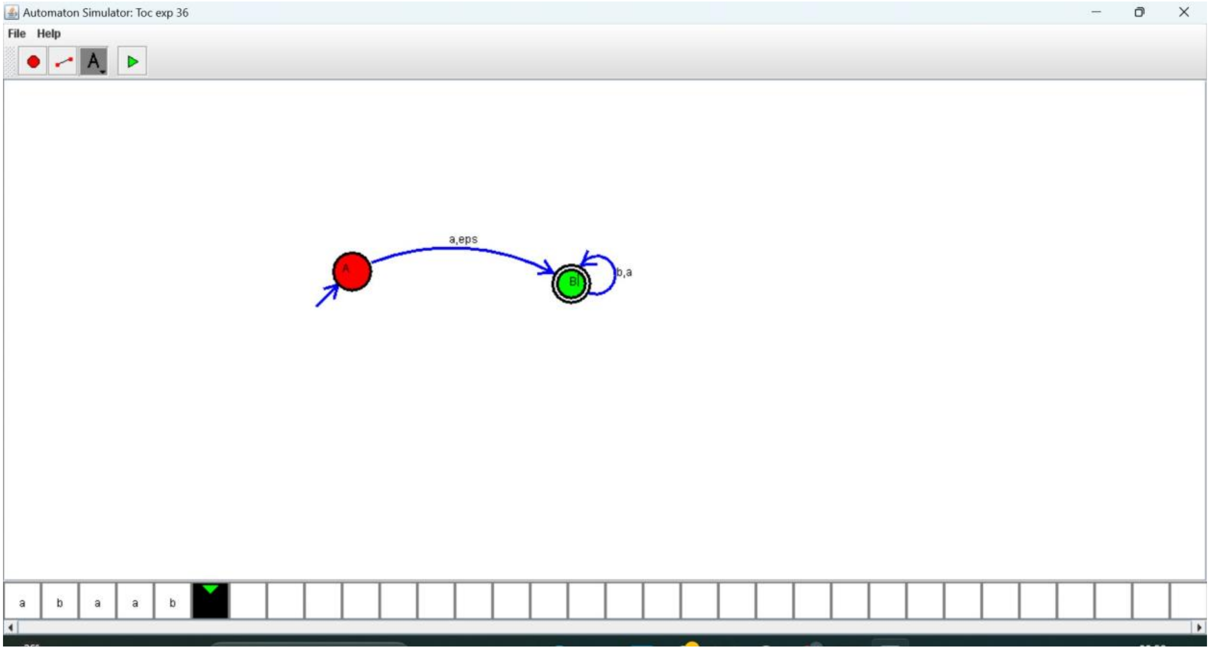
34. Design DFA using simulator to accept even number of c's over the set {a, b, c}



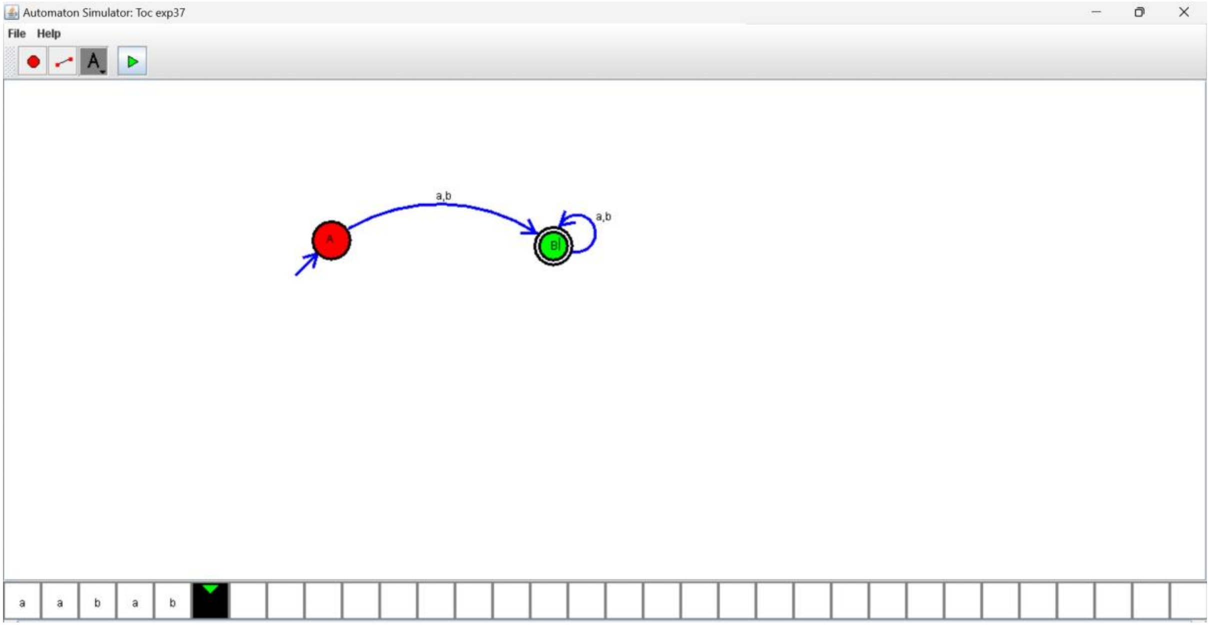
35. Design DFA using simulator to accept strings in which a's always appear tripled over input {a, b}



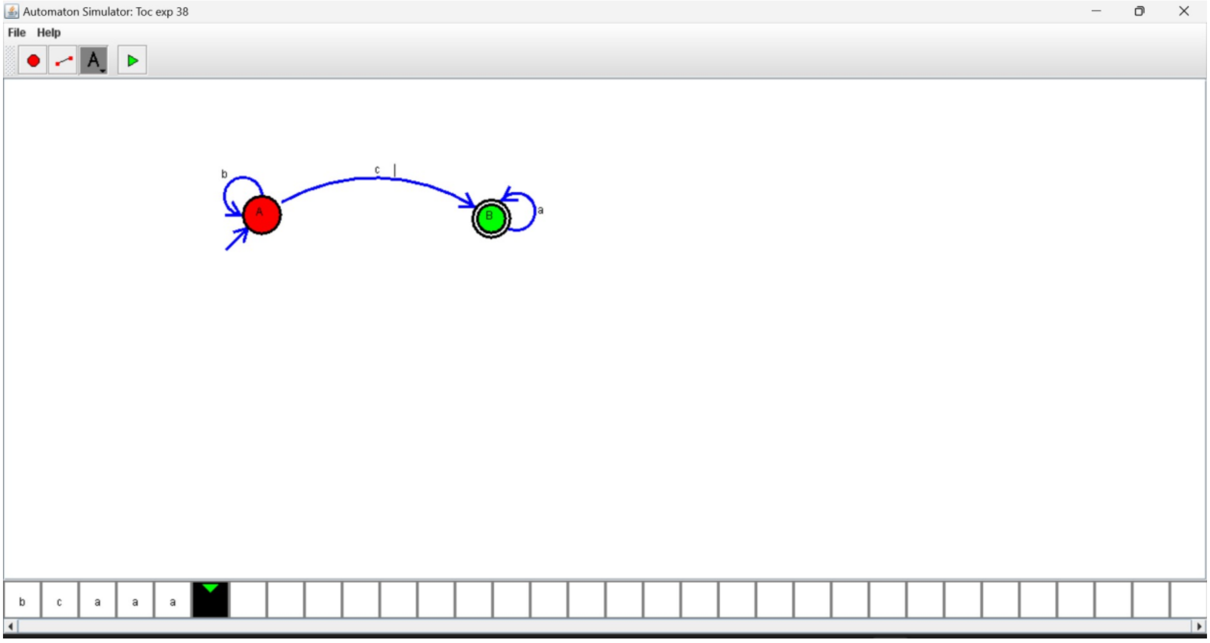
36. Design NFA using simulator to accept the string the start with a and end with b over set {a, b} and check W= abaab is accepted or not.



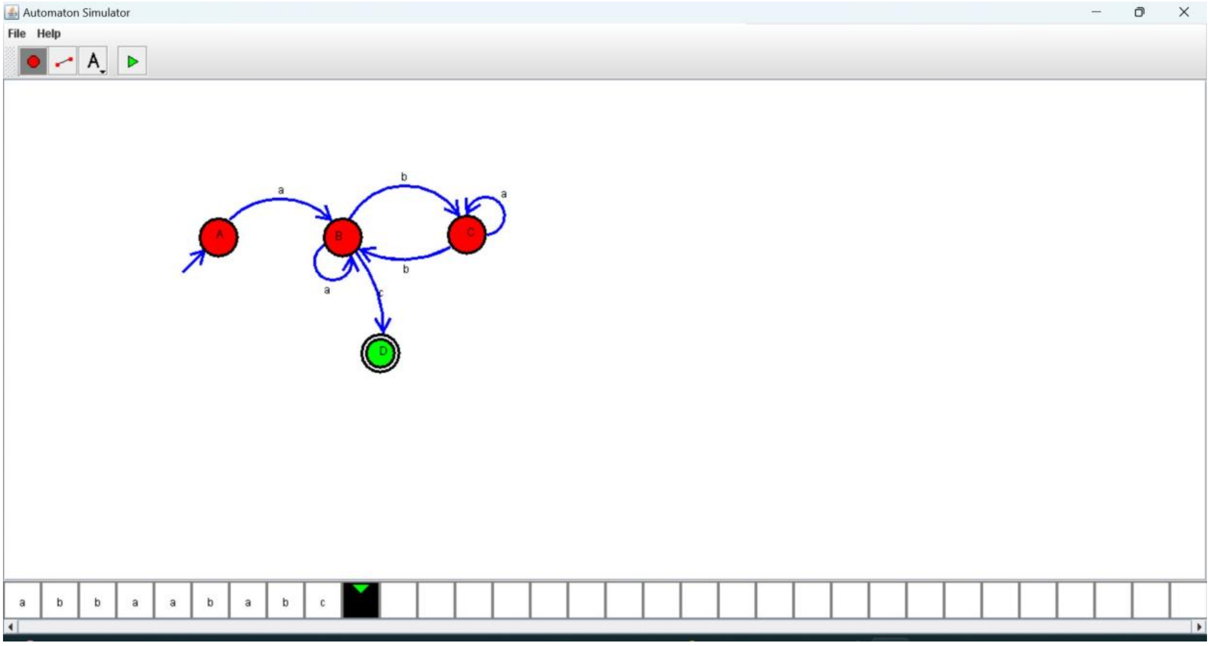
37. Design NFA using simulator to accept the string that start and end with different symbols over the input {a, b}.



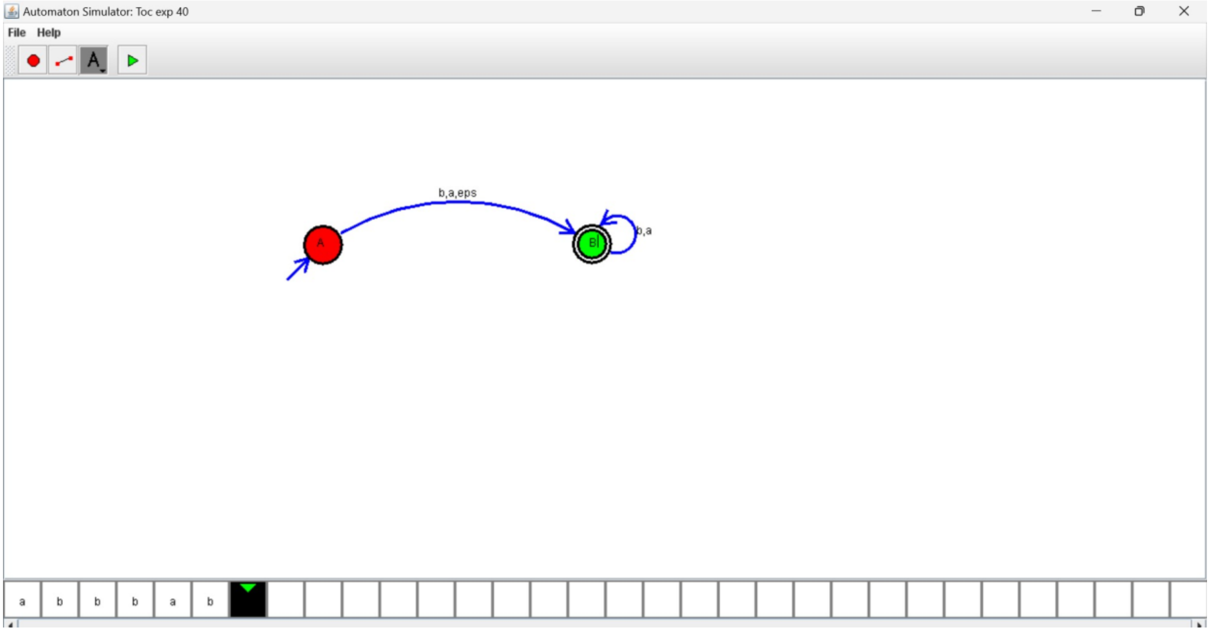
38. Design NFA using simulator to accept the input string “bbc”,” c”, and” bcaaa”.



39. Design DFA using simulator to accept the string the end with abc over set {a, b, c) W= abbaababc



40. Design NFA to accept any number of b’s where input = {a, b}.


Automaton Simulator: Toc exp 40
File Help
b,a,eps
b,a
A
B
a b b b a b