BCSE307P – Compiler Design Lab

Winter Semester 2023-24

Assessment 10

SLR Parser

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Slot: L7 + L8

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Input:

1.

S S+T
S T
T T*F
T F
F (S)
F t

2.

S AA
A aA
A b

Task:

Implementation of SLR parser

Code:

```
#include<stdio.h>

#include<string.h>

int i,j,k,m,n=0,o,p,ns=0,tn=0,rr=0,ch=0;

char
read[15][10],gl[15],gr[15][10],temp,templ[15],tempr[15][10],*ptr,tem
p2[5],dfa[15][15], get;



struct states

{

    char lhs[15],rhs[15][10];

    int n;

}I[15];



int compstruct(struct states s1,struct states s2)

{
    int t;

    if(s1.n!=s2.n)

        return 0;

    if( strcmp(s1.lhs,s2.lhs)!=0 )

        return 0;

    for(t=0;t<s1.n;t++)

        if( strcmp(s1.rhs[t],s2.rhs[t])!=0 )

            return 0;

    return 1;

}


void moreprod()

{

    int r,s,t,l1=0,rr1=0;

    char *ptr1,read1[15][10];


    for(r=0;r<I[ns].n;r++)

    {

        ptr1=strchr(I[ns].rhs[l1],'.');

        t=ptr1-I[ns].rhs[l1];

        if( t+1==strlen(I[ns].rhs[l1]) )

        {

            l1++;

            continue;

        }

        temp=I[ns].rhs[l1][t+1];
        }

        l1++;

        for(s=0;s<rr1;s++)

            if( temp==read1[s][0] )

                break;

        if(s==rr1)

        {

            read1[rr1][0]=temp;

            rr1++;

        }

        else

            continue;


        for(s=0;s<n;s++)

        {

            if(gl[s]==temp)

            {

                I[ns].rhs[I[ns].n][0]='.';

                I[ns].rhs[I[ns].n][1]=NULL;

                strcat(I[ns].rhs[I[ns].n],gr[s]);

                I[ns].lhs[I[ns].n]=gl[s];

                I[ns].lhs[I[ns].n+1]=NULL;

                I[ns].n++;

            }

        }

    }

}
```

```
void canonical(int l)
{
    int t1;
    char read1[15][10],rr1=0,*ptr1;
    for(i=0;i<I[l].n;i++)
    {
        temp2[0]='.';
        ptr1=strchr(I[l].rhs[i],'.');
        t1=ptr1-I[l].rhs[i];
        if( t1+1==strlen(I[l].rhs[i]) )
            continue;

        temp2[1]=I[l].rhs[i][t1+1];
        temp2[2]=NULL;

        for(j=0;j<rr1;j++)
            if( strcmp(temp2,read1[j])==0 )
                break;
        if(j==rr1)
        {
            strcpy(read1[rr1],temp2);
            read1[rr1][2]=NULL;
            rr1++;
        }
        else
            continue;

        for(j=0;j<I[0].n;j++)
        {
            ptr=strstr(I[l].rhs[j],temp2);
            if( ptr )
            {
                templ[tn]=I[l].lhs[j];
                templ[tn+1]=NULL;
                strcpy(tempr[tn],I[l].rhs[j]);
                tn++;
            }
        }

        for(j=0;j<tn;j++)
        {
            ptr=strchr(tempr[j],'.');
            p=ptr-tempr[j];
            tempr[j][p]=tempr[j][p+1];
            tempr[j][p+1]='.';
            I[ns].lhs[I[ns].n]=templ[j];
            I[ns].lhs[I[ns].n+1]=NULL;
            strcpy(I[ns].rhs[I[ns].n],tempr[j]);
            I[ns].n++;
        }
```

```
moreprod();

for(j=0;j<ns;j++)

{

    //if ( memcmp(&I[ns],&I[j],sizeof(struct states))==1 )

    if( compstruct(I[ns],I[j])==1 )

    {

        I[ns].lhs[0]=NULL;

        for(k=0;k<I[ns].n;k++)

            I[ns].rhs[k][0]=NULL;

        I[ns].n=0;

        dfa[l][j]=temp2[1];

        break;

    }

}

if(j<ns)

{

    tn=0;

    for(j=0;j<15;j++)

    {

        templ[j]=NULL;

        tempr[j][0]=NULL;

    }

    continue;

}


dfa[l][j]=temp2[1];
```

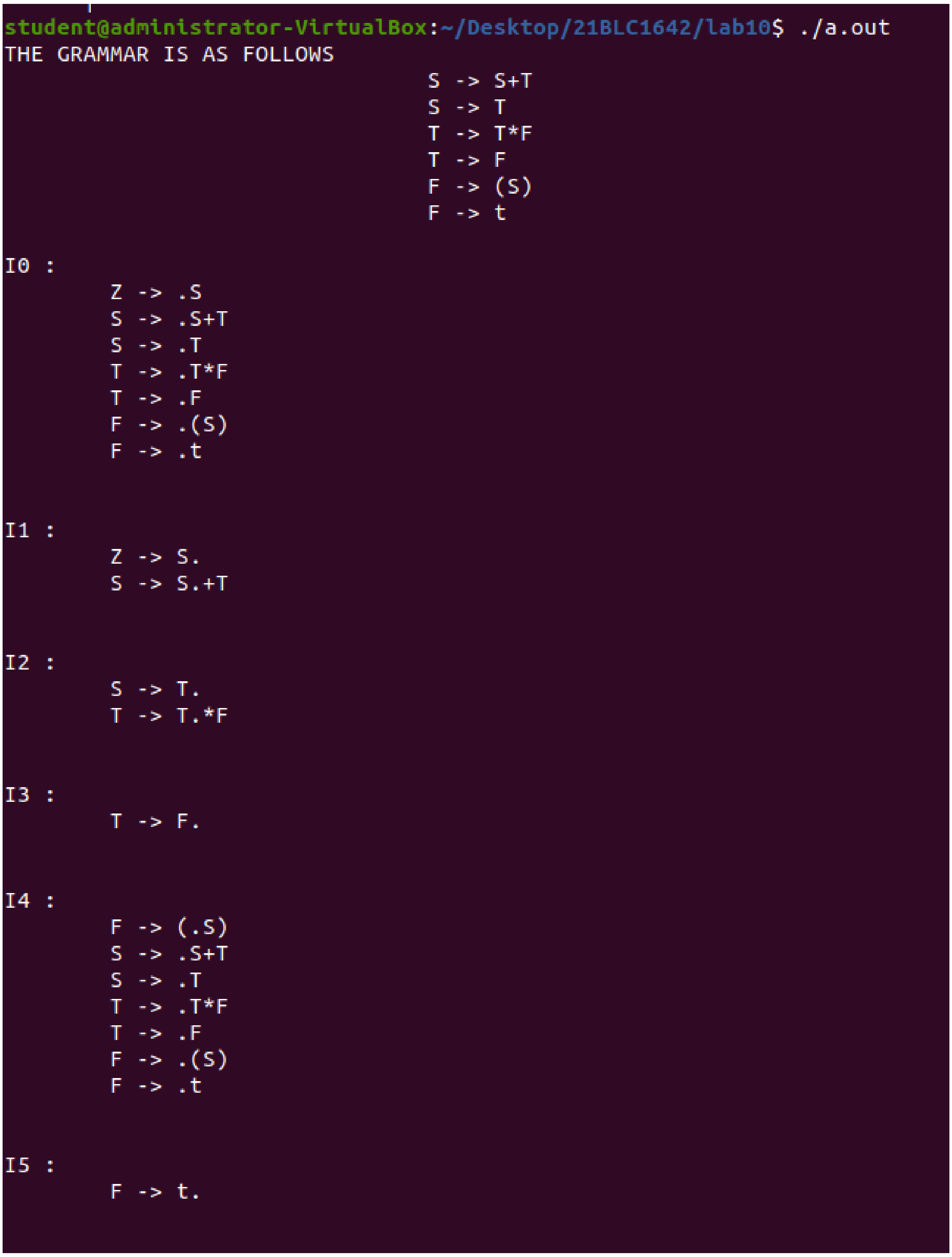
```
        printf("\n\nI%d :",ns);
        for(j=0;j<I[ns].n;j++)
            printf("\n\t%c -> %s",I[ns].lhs[j],I[ns].rhs[j]);
        scanf("%c", &get);
        ns++;
        tn=0;
        for(j=0;j<15;j++)
        {
            templ[j]=NULL;
            tempr[j][0]=NULL;
        }
    }
}

void main()
{
    FILE *f;
    int l;

    for(i=0;i<15;i++)
    {
        I[i].n=0;
        I[i].lhs[0]=NULL;
        I[i].rhs[0][0]=NULL;
        dfa[i][0]=NULL;
    }
```

```
f=fopen("lab10_ip.txt","r");
while(!feof(f))
{
    fscanf(f,"%c",&gl[n]);
    fscanf(f,"%s\n",gr[n]);
    n++;
}

printf("THE GRAMMAR IS AS FOLLOWS\n");
for(i=0;i<n;i++)
    printf("\t\t\t\t%c -> %s\n",gl[i],gr[i]);

I[0].lhs[0]='Z';
strcpy(I[0].rhs[0],".S");
I[0].n++;
l=0;
for(i=0;i<n;i++)
{
    temp=I[0].rhs[l][1];
    l++;
    for(j=0;j<rr;j++)
        if( temp==read[j][0] )
            break;
    if(j==rr)
    {
        read[rr][0]=temp;
        rr++;
    }
    else
        continue;
    for(j=0;j<n;j++)
    {
        if(gl[j]==temp)
        {
            I[0].rhs[I[0].n][0]='.';
            strcat(I[0].rhs[I[0].n],gr[j]);
            I[0].lhs[I[0].n]=gl[j];
            I[0].n++;
        }
    }
}
ns++;

printf("\nI%d :\n",ns-1);
for(i=0;i<I[0].n;i++)
    printf("\t%c -> %s\n",I[0].lhs[i],I[0].rhs[i]);

for(l=0;l<ns;l++)
    canonical(l);

printf("\n\n\t\tPRESS ANY KEY FOR DFA TABLE");
```

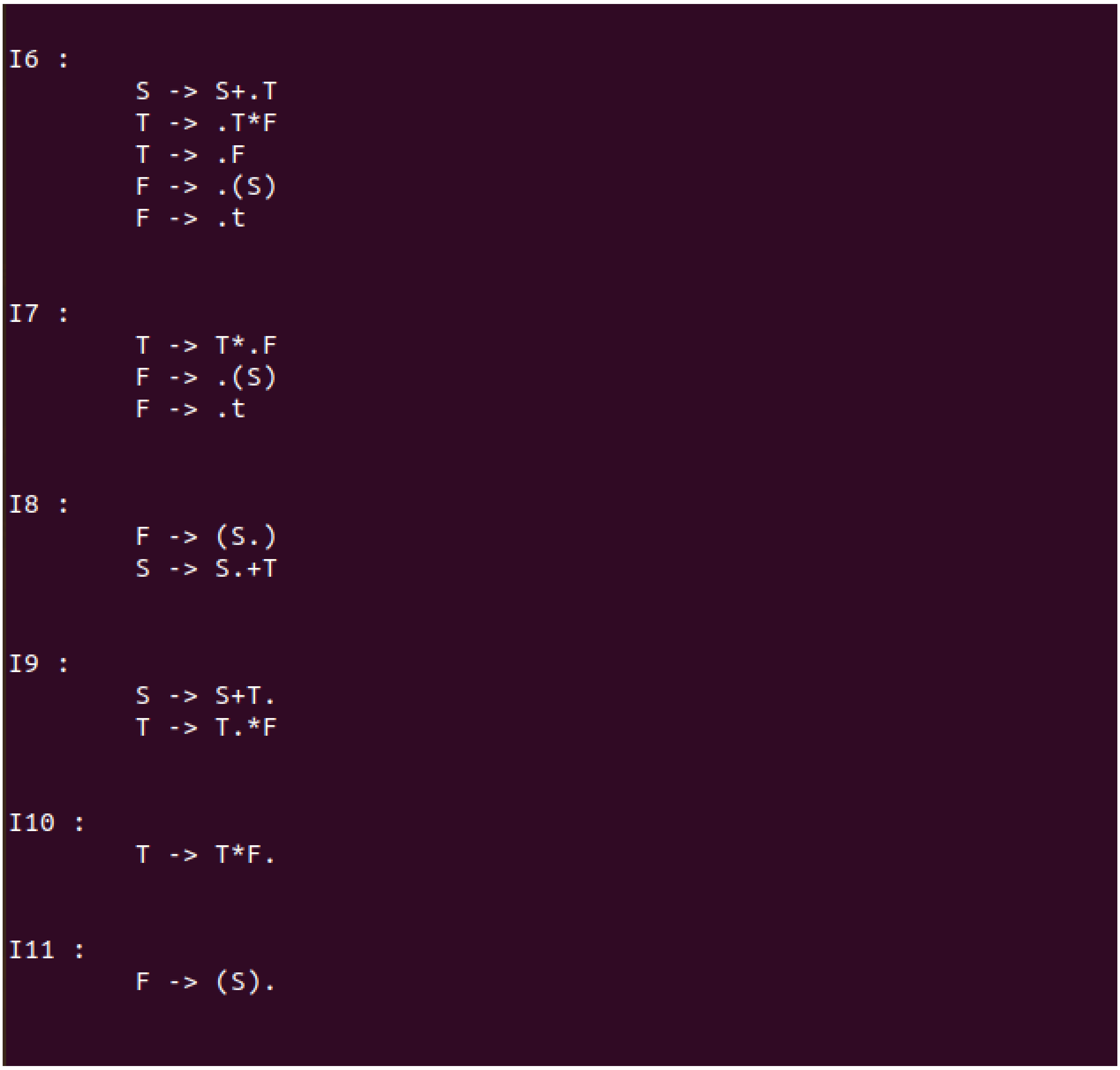
```
    scanf("%c", &get);


    printf("\t\t\tDFA TABLE IS AS FOLLOWS\n\n\n");

    for(i=0;i<ns;i++)

    {

        printf("I%d : ",i);

        for(j=0;j<ns;j++)

            if(dfa[i][j]!='\0')

                printf("'%c'->I%d | ",dfa[i][j],j);

        printf("\n\n\n");

    }

    printf("\n\n\n\t\tPRESS ANY KEY TO EXIT");

    scanf("%c", &get);

}
```

Output:

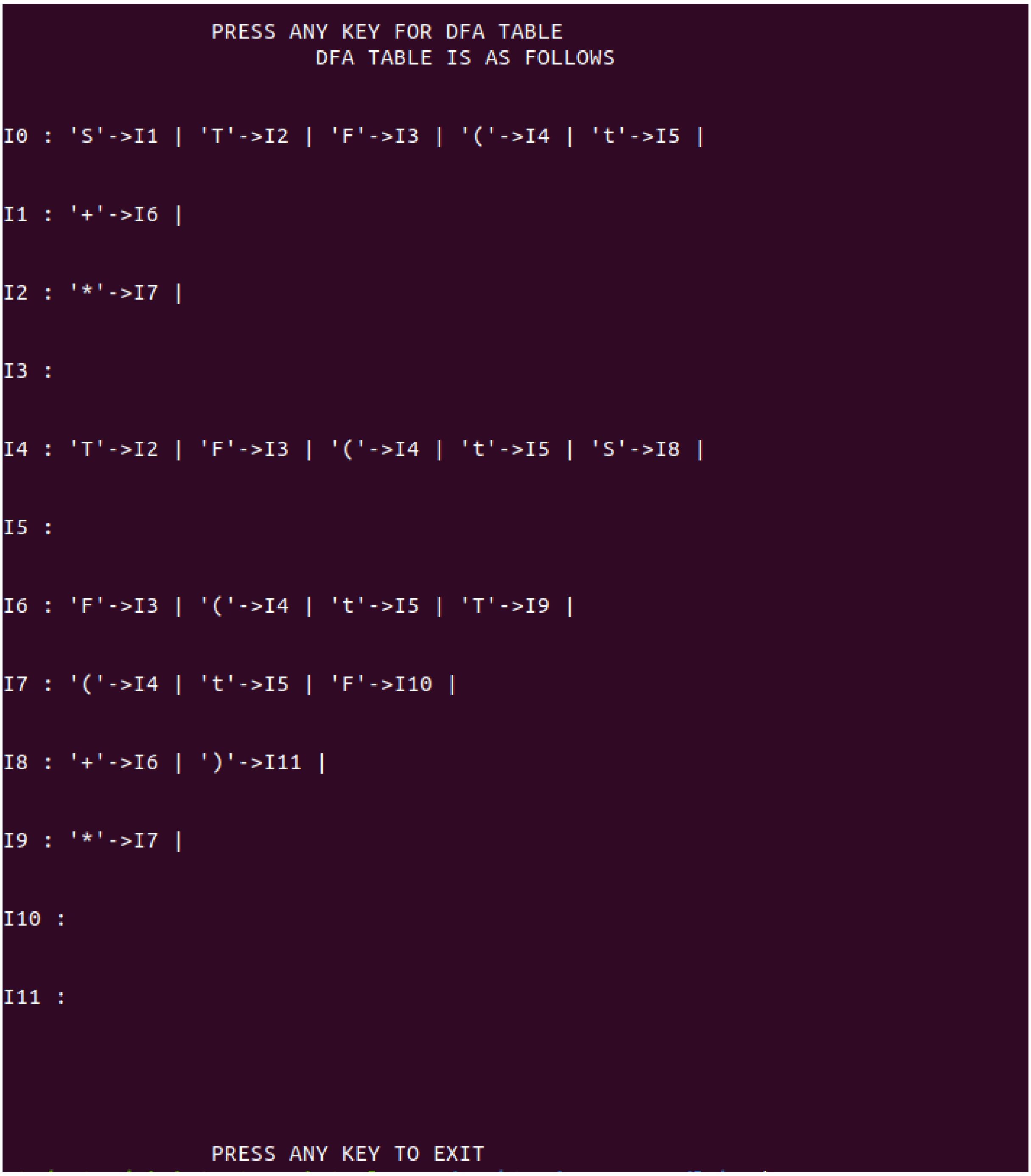
Input 1:



```
student@administrator-VirtualBox:~/Desktop/21BLC1642/lab10$ ./a.out
THE GRAMMAR IS AS FOLLOWS
                                S -> S+T
                                S -> T
                                T -> T*F
                                T -> F
                                F -> (S)
                                F -> t

I0 :
        Z -> .S
        S -> .S+T
        S -> .T
        T -> .T*F
        T -> .F
        F -> .(S)
        F -> .t


I1 :
        Z -> S.
        S -> S.+T


I2 :
        S -> T.
        T -> T.*F


I3 :
        T -> F.


I4 :
        F -> (.S)
        S -> .S+T
        S -> .T
        T -> .T*F
        T -> .F
        F -> .(S)
        F -> .t


I5 :
        F -> t.
```

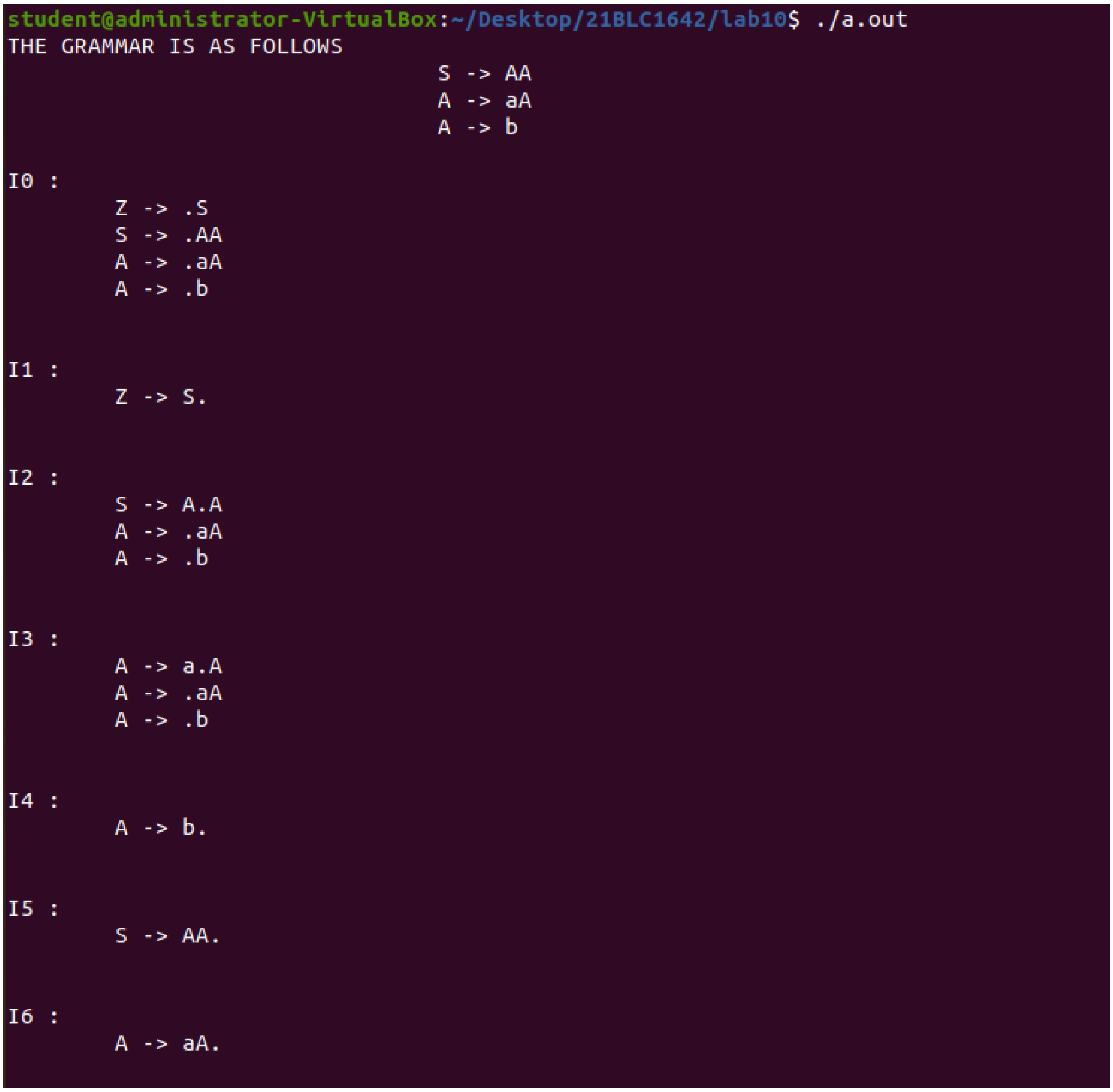


```
I6 :
        S -> S+.T
        T -> .T*F
        T -> .F
        F -> .(S)
        F -> .t


I7 :
        T -> T*.F
        F -> .(S)
        F -> .t


I8 :
        F -> (S.)
        S -> S.+T


I9 :
        S -> S+T.
        T -> T.*F


I10 :
        T -> T*F.


I11 :
        F -> (S).
```

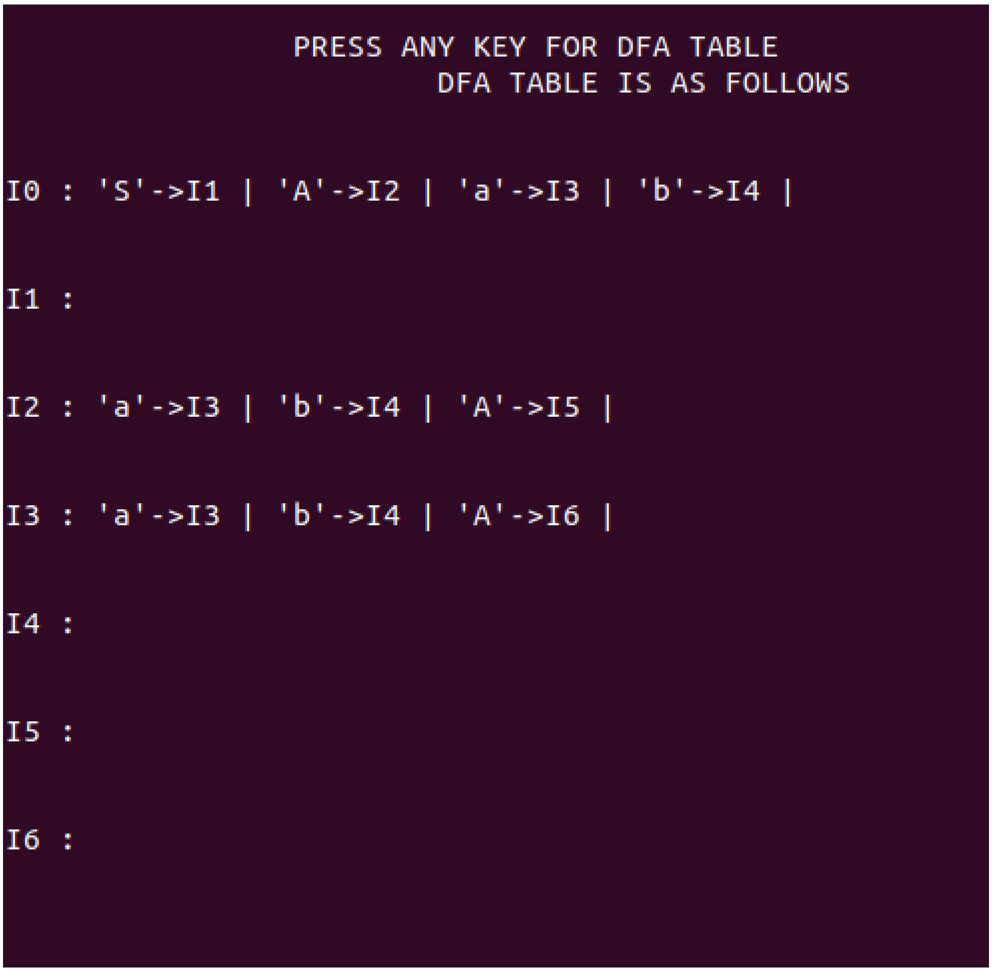


```
                PRESS ANY KEY FOR DFA TABLE
                        DFA TABLE IS AS FOLLOWS


I0 : 'S'->I1 | 'T'->I2 | 'F'->I3 | '('->I4 | 't'->I5 |


I1 : '+'->I6 |


I2 : '*'->I7 |


I3 :


I4 : 'T'->I2 | 'F'->I3 | '('->I4 | 't'->I5 | 'S'->I8 |


I5 :


I6 : 'F'->I3 | '('->I4 | 't'->I5 | 'T'->I9 |


I7 : '('->I4 | 't'->I5 | 'F'->I10 |


I8 : '+'->I6 | ')'->I11 |


I9 : '*'->I7 |


I10 :


I11 :




                PRESS ANY KEY TO EXIT
```

Input 2:



```
student@administrator-VirtualBox:~/Desktop/21BLC1642/lab10$ ./a.out
THE GRAMMAR IS AS FOLLOWS
                                S -> AA
                                A -> aA
                                A -> b

I0 :
        Z -> .S
        S -> .AA
        A -> .aA
        A -> .b


I1 :
        Z -> S.


I2 :
        S -> A.A
        A -> .aA
        A -> .b


I3 :
        A -> a.A
        A -> .aA
        A -> .b


I4 :
        A -> b.


I5 :
        S -> AA.


I6 :
        A -> aA.
```



```
                PRESS ANY KEY FOR DFA TABLE
                        DFA TABLE IS AS FOLLOWS


I0 : 'S'->I1 | 'A'->I2 | 'a'->I3 | 'b'->I4 |


I1 :


I2 : 'a'->I3 | 'b'->I4 | 'A'->I5 |


I3 : 'a'->I3 | 'b'->I4 | 'A'->I6 |


I4 :


I5 :


I6 :
```

Result:

Thus, the experiment has been successfully executed and verified.