Table of Contents

1 ONE

1.1 1A

```
%{
int a[]={0,0}, i, v=1, o=0;
void ex();
%}
%x O
%%
[a-zA-Z0-9]+    { BEGIN O; o++;}
<O>"+"                  { if(v) { v=0;i=0; } else ex(); }
<O>"*"                  { if(v) { v=0;i=1; } else ex(); }
<O>[a-zA-Z0-9]+         { o++;
                                if(v==0)
                                {
                                        v=1;a[i]++;
                                }
                                else
                                        ex();
                        }
<O>"\n"                 { if(v==0)
                                ex();
                          else
                                return 0;
                        }
.|\n                    ex();
%%
void ex()
{
        printf("invalid expression\n");
        exit(0);
}
void main()
{
        printf("enter\n");
        yylex();
        if(v==0)
                printf("not valid expression");
        else
        {
                printf("valid expression\n");
                printf("no of operand : %d \n",o);
                printf("no of addition : %d \n",a[0]);
                printf("no of multiply : %d \n",a[1]);
        }
}
```

```
File  Edit  View  Search  Terminal  Help
csestudents@Administrator:~/ssos$ lex 1a.l
csestudents@Administrator:~/ssos$ cc lex.yy.c -ll
csestudents@Administrator:~/ssos$ ./a.out
enter
9+@
@invalid expression
csestudents@Administrator:~/ssos$ ./a.out
enter
9+2
valid expression
no of operand : 2
no of addition : 1
no of multiply : 0
csestudents@Administrator:~/ssos$ ./a.out
enter
q*w
valid expression
no of operand : 2
no of addition : 0
no of multiply : 1
csestudents@Administrator:~/ssos$ ./a.out
enter
1-2
-invalid expression
csestudents@Administrator:~/ssos$ ./a.out
enter
q+3
valid expression
no of operand : 2
no of addition : 1
no of multiply : 0
csestudents@Administrator:~/ssos$
```

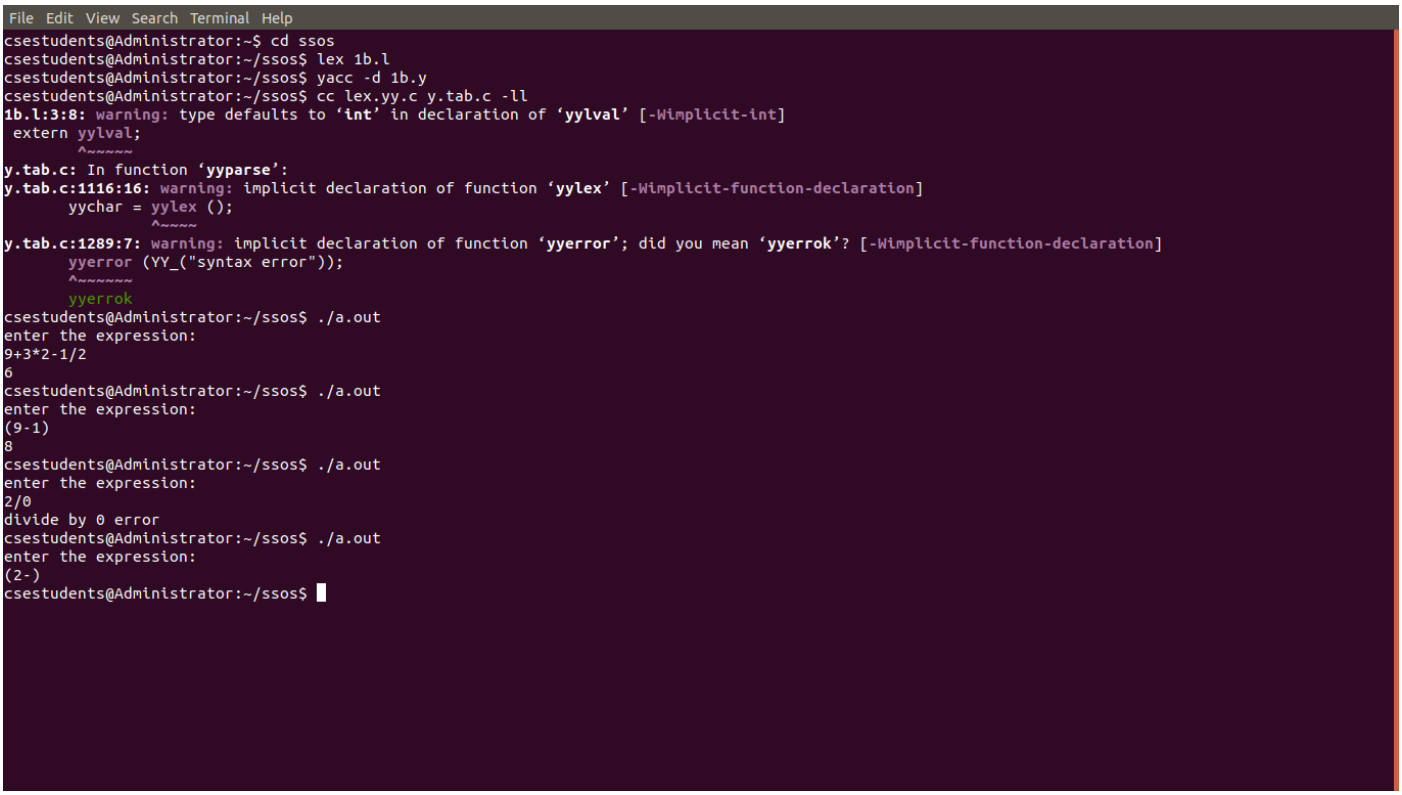
1.2 1B.L

```
%{
#include "y.tab.h"
extern yylval;
%}
%%
[0-9]+ {yylval=atoi(yytext);return num;}
[\+\-\*\/] {return yytext[0];}
[)] {return yytext[0];}
[(] {return yytext[0];}
. {;}
\n {return 0;}
%%
```

1.3 1B.Y

```
%{
#include<stdio.h>
#include<stdlib.h>
%}
%token num
%left '*' '/'
%left '+' '-'
%%
input:exp{printf("%d\n",$$);exit(0);}
exp:exp'+'exp {$$=$1+$3;}
|exp'-'exp {$$=$1-$3;}
|exp'*'exp {$$=$1*$3;}
|exp'/'exp { if($3==0){printf("divide by 0 error\n");exit(0);}
else
$$=$1/$3;}
|'('exp')' {$$=$2;};
|num{$$=$1;};
%%
```

```
int yyerror()
{
printf("error");
exit(0);
}
int main()
{
printf("enter the expression:\n");
yyparse();
}
```



2 Two

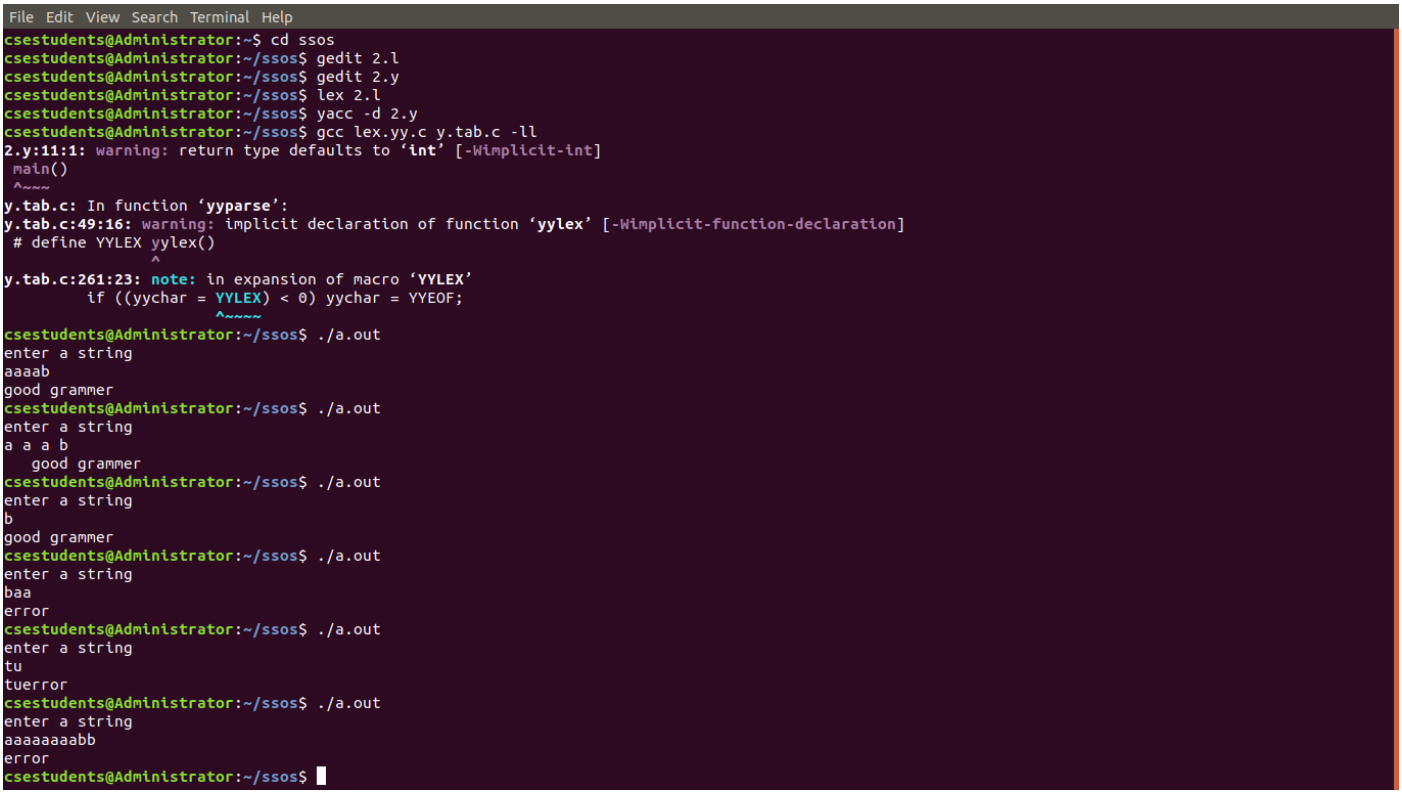
2.1 2.l

```
%{
#include "y.tab.h"
%}
%%
a {return A;}
b {return B;}
[\n] return '\n';
%%
```

2.2 2.y

```
%{
#include<stdio.h>
#include<stdlib.h>
%}
%token A B
%%
input:s'\n' {printf("good grammer\n");exit(0);}
```

```
s:A s1 B| B
s1:;|A s1
%%
main()
{
        printf("enter a string\n");yyparse();
}
int yyerror()
{
        printf("error\n");exit(0);
}
```



```
File  Edit  View  Search  Terminal  Help
csestudents@Administrator:~$ cd ssos
csestudents@Administrator:~/ssos$ gedit 2.l
csestudents@Administrator:~/ssos$ gedit 2.y
csestudents@Administrator:~/ssos$ lex 2.l
csestudents@Administrator:~/ssos$ yacc -d 2.y
csestudents@Administrator:~/ssos$ gcc lex.yy.c y.tab.c -ll
2.y:11:1: warning: return type defaults to 'int' [-Wimplicit-int]
 main()
 ^~~~
y.tab.c: In function 'yyparse':
y.tab.c:49:16: warning: implicit declaration of function 'yylex' [-Wimplicit-function-declaration]
 # define YYLEX yylex()
                ^
y.tab.c:261:23: note: in expansion of macro 'YYLEX'
         if ((yychar = YYLEX) < 0) yychar = YYEOF;
                       ^~~~~
csestudents@Administrator:~/ssos$ ./a.out
enter a string
aaaab
good grammer
csestudents@Administrator:~/ssos$ ./a.out
enter a string
a a a b
   good grammer
csestudents@Administrator:~/ssos$ ./a.out
enter a string
b
good grammer
csestudents@Administrator:~/ssos$ ./a.out
enter a string
baa
error
csestudents@Administrator:~/ssos$ ./a.out
enter a string
tu
tuerror
csestudents@Administrator:~/ssos$ ./a.out
enter a string
aaaaaaaabb
error
csestudents@Administrator:~/ssos$
```

3 THREE

3.1 3.C

```
#include<stdio.h>
#include<string.h>
#include<stdlib.h>
int num(char c)
{
  switch(c)
  {
    case'A':return 0;
    case'B':return 1;
    case'a':return 0;
    case'b':return 1;
    case'@':return 2;
  }
  return 1;
}
int main()
{
```

```
char m[2][3][10]={{"E\0","E\0","E\0"},{"E\0","E\0","E\0"}},ip[100],stack[100];
char first[3][10]={"a\0","b\0","@\0"},follow[3][10]={"$\0","a\0","a\0"},LHS[3][3]={"A\0","B\0","B\0"},
                RHS[3][4]={"aBa\0","bB\0","@\0"};
int size[2][3]={3,1,1,1,2,1},p,q,r,i,j,n,k,row,col;
printf("\nfirst={%c,%c,%c}",first[0][0],first[1][0],first[2][0]);
printf("\nfollow={%c,%c}\n\n\n",follow[0][0],follow[1][0]);
for(i=0;i<3;i++)
{
        if(first[i][0]!='@')
            strcpy(m[num(LHS[i][0])][num(first[i][0])],RHS[i]);
        else
       strcpy(m[num(LHS[i][0])][num(follow[i][0])],RHS[i]);
}
printf("Input the String:\n");
scanf("%s",ip);
strcat(ip,"$");
n=strlen(ip);
stack[0]='$';
stack[1]='A';
i=1;j=0;
printf("Parsing Table\n");
for(p=0;p<2;p++)
{
        for(q=0;q<3;q++)
                printf("%s\t",m[p][q]);
        printf("\n");
}
        printf("\nStack\tInput\n");
        for(k=0;k<=i;k++)
                printf("%c",stack[k]);
        printf("\t");
        for(k=j;k<=n;k++)
                printf("%c",ip[k]);
        printf("\n");
        while((stack[i]!='$')&&(ip[j]!='$'))
        {
                if(stack[i]==ip[j])
                {
                        i--;
                        j++;
                        for(k=0;k<=i;k++)
                                printf("%c",stack[k]);
                        printf("\t");
                        for(k=j;k<=n;k++)
                                printf("%c",ip[k]);
                        printf("\n");
                }
                switch(stack[i])
                {
                        case 'A': row=0;break;
                        case 'B': row=1;break;
                        default:
                                if((stack[i]=='$')&&(ip[j]=='$'))
                                        printf("Successful Parsing\n");
                                else
                                        printf("Parsing Error\n");
                                exit(0);
                }
```

```
                switch(ip[j])
                {
                        case 'a': col=0; break;
                        case 'b': col=1; break;
                        case 'c': col=2; break;
                }
                if(m[row][col][0]==ip[j])
                {
                        for(k=size[row][col]-1;k>=0;k--)
                        {
                                stack[i]=m[row][col][k];
                                i++;
                        }
                        i--;
                }
                if(m[row][col][0]=='E')
                {
                        if(i>0)
                        {
                                printf("Error\n");
                                exit(0);
                        }
                }
                if(m[row][col][0]=='@')
                        i--;
                for(k=0;k<=i;k++)
                                printf("%c",stack[k]);
                printf("\t");
                for(k=j;k<=n;k++)
                                printf("%c",ip[k]);
                printf("\n");
        }
}
```

```
dev@dev:~/ssos-main$ gedit 3.c
dev@dev:~/ssos-main$ gcc 3.c
dev@dev:~/ssos-main$ ./a.out

first={a,b,@}
follow={$,a}


Input the String:
abba$
Parsing Table
aBa     E       E
@       bB      E

Stack   Input
$A      abba$$
$aBa    abba$$
$aB     bba$$
$aBb    bba$$
$aB     ba$$
$aBb    ba$$
$aB     a$$
$a      a$$
$       $$
Successful Parsing
dev@dev:~/ssos-main$ ./a.out

first={a,b,@}
follow={$,a}


Input the String:
aaab$
Parsing Table
aBa     E       E
@       bB      E

Stack   Input
$A      aaab$$
$aBa    aaab$$
$aB     aab$$
$a      aab$$
$       ab$$
Parsing Error
dev@dev:~/ssos-main$
```

4 FOUR

4.1 4.C

```
#include<stdio.h>
#include<string.h>
int k=0,z=0,i=0,j=0,c=0;
char a[16],ac[20],stk[15],act[10];
void check();
void main()
{
	puts("GRAMMAR is \nE->E+E \n E->E*E \n E->(E) \n E->id");
	puts("enter input string ");
	gets(a);
	c=strlen(a);
	strcpy(act,"SHIFT->");
	puts("\nstack \t input \t action");
	for(k=0,i=0; j<c; k++,i++,j++)
	{
		if(a[j]=='i' && a[j+1]=='d')
		{
			stk[i]=a[j];
			stk[i+1]=a[j+1];
			stk[i+2]='\0';
			a[j]=' ';
			a[j+1]=' ';
			printf("$%s\t%s$\t%sid\n",stk,a,act);
			check();
		}
		else
		{
			stk[i]=a[j];
			stk[i+1]='\0';
			a[j]=' ';
			printf("$%s\t%s$\t%ssymbols\n",stk,a,act);
			check();
		}
	}
}
void check()
{
	strcpy(ac,"REDUCE TO E ");
	for(z=0; z<c; z++)
		if(stk[z]=='i' && stk[z+1]=='d')
		{
			stk[z]='E';
			stk[z+1]='\0';
			printf("$%s\t%s$\t%s\n",stk,a,ac);
			j++;
		}
	for(z=0; z<c; z++)
		if(stk[z]=='E' && stk[z+1]=='+' && stk[z+2]=='E')
		{
			stk[z]='E';
			stk[z+1]='\0';
			stk[z+2]='\0';
			printf("$%s\t%s$\t%s\n",stk,a,ac);
			i=i-2;
```

```
		}
	for(z=0; z<c; z++)
		if(stk[z]=='E' && stk[z+1]=='*' && stk[z+2]=='E')
		{
			stk[z]='E';
			stk[z+1]='\0';
			stk[z+2]='\0';
			printf("$%s\t%s$\t%s\n",stk,a,ac);
			i=i-2;
		}
	for(z=0; z<c; z++)
		if(stk[z]=='(' && stk[z+1]=='E' && stk[z+2]==')')
		{
			stk[z]='E';
			stk[z+1]='\0';
			stk[z+2]='\0';
			printf("$%s\t%s$\t%s\n",stk,a,ac);
			i=i-2;
		}
}
```

```
File  Edit  View  Search  Terminal  Help
csestudents@Administrator:~$ cd ssos
csestudents@Administrator:~/ssos$ ./a.out
GRAMMAR is E->E+E
 E->E*E
 E->(E)
 E->id
enter input string
id+id*id

stack    input   action
$id       +id*id$       SHIFT->id
$E        +id*id$       REDUCE TO E
$E+        id*id$       SHIFT->symbols
$E+id        *id$       SHIFT->id
$E+E         *id$       REDUCE TO E
$E           *id$       REDUCE TO E
$E*           id$       SHIFT->symbols
$E*id           $       SHIFT->id
$E*E            $       REDUCE TO E
$E              $       REDUCE TO E
csestudents@Administrator:~/ssos$ ./a.out
GRAMMAR is E->E+E
 E->E*E
 E->(E)
 E->id
enter input string
id*id+id

stack    input   action
$id       *id+id$       SHIFT->id
$E        *id+id$       REDUCE TO E
$E*        id+id$       SHIFT->symbols
$E*id        +id$       SHIFT->id
$E*E         +id$       REDUCE TO E
$E           +id$       REDUCE TO E
$E+           id$       SHIFT->symbols
$E+id           $       SHIFT->id
$E+E            $       REDUCE TO E
$E              $       REDUCE TO E
csestudents@Administrator:~/ssos$ ./a.out
GRAMMAR is E->E+E
```

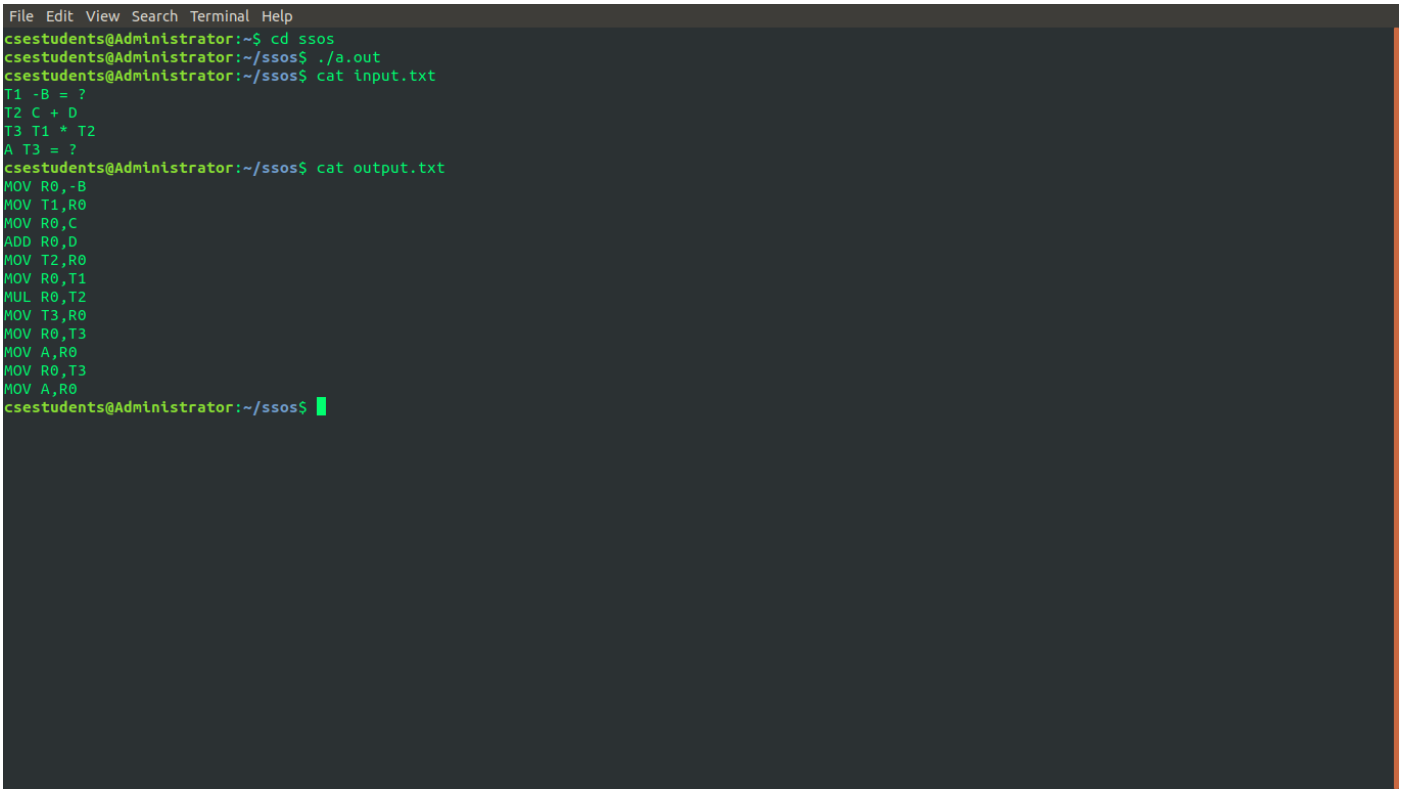
```
File  Edit  View  Search  Terminal  Help
 E->E*E
 E->(E)
 E->id
enter input string
id+id

stack    input   action
$id       +id$  SHIFT->id
$E        +id$  REDUCE TO E
$E+        id$  SHIFT->symbols
$E+id        $  SHIFT->id
$E+E         $  REDUCE TO E
$E           $  REDUCE TO E
csestudents@Administrator:~/ssos$ ./a.out
GRAMMAR is E->E+E
 E->E*E
 E->(E)
 E->id
enter input string
id*id

stack    input   action
$id       *id$  SHIFT->id
$E        *id$  REDUCE TO E
$E*        id$  SHIFT->symbols
$E*id        $  SHIFT->id
$E*E         $  REDUCE TO E
$E           $  REDUCE TO E
csestudents@Administrator:~/ssos$ ./a.out
GRAMMAR is E->E+E
 E->E*E
 E->(E)
 E->id
enter input string
id+

stack    input   action
$id       +$    SHIFT->id
$E        +$    REDUCE TO E
$E+        $    SHIFT->symbols
csestudents@Administrator:~/ssos$
```

5 FIVE

5.1 5.C

```
#include<stdio.h>
#include<stdlib.h>
#include<ctype.h>
char op[2],arg1[5],arg2[5],result[5];
void main()
{
	FILE *fp1,*fp2;
	fp1=fopen("input.txt","r");
	fp2=fopen("output.txt","w");
	while(!feof(fp1))
	{
		fscanf(fp1,"%s%s%s%s",result,arg1,op,arg2);
		if(strcmp(op,"+")==0)
		{
			fprintf(fp2,"MOV R0,%s\n",arg1);
			fprintf(fp2,"ADD R0,%s\n",arg2);
			fprintf(fp2,"MOV %s,R0\n",result);
		}
		if(strcmp(op,"*")==0)
		{
			fprintf(fp2,"MOV R0,%s\n",arg1);
			fprintf(fp2,"MUL R0,%s\n",arg2);
			fprintf(fp2,"MOV %s,R0\n",result);
		}
		if(strcmp(op,"-")==0)
		{
			fprintf(fp2,"MOV R0,%s\n",arg1);
			fprintf(fp2,"SUB R0,%s\n",arg2);
			fprintf(fp2,"MOV %s,R0\n",result);
```

```
                }
                if(strcmp(op,"/")==0)
                {
                        fprintf(fp2,"MOV R0,%s\n",arg1);
                        fprintf(fp2,"DIV R0,%s\n",arg2);
                        fprintf(fp2,"MOV %s,R0\n",result);
                }
                if(strcmp(op,"=")==0)
                {
                        fprintf(fp2,"MOV R0,%s\n",arg1);
                        fprintf(fp2,"MOV %s,R0\n",result);
                }
        }
        fclose(fp1);
        fclose(fp2);
}
```

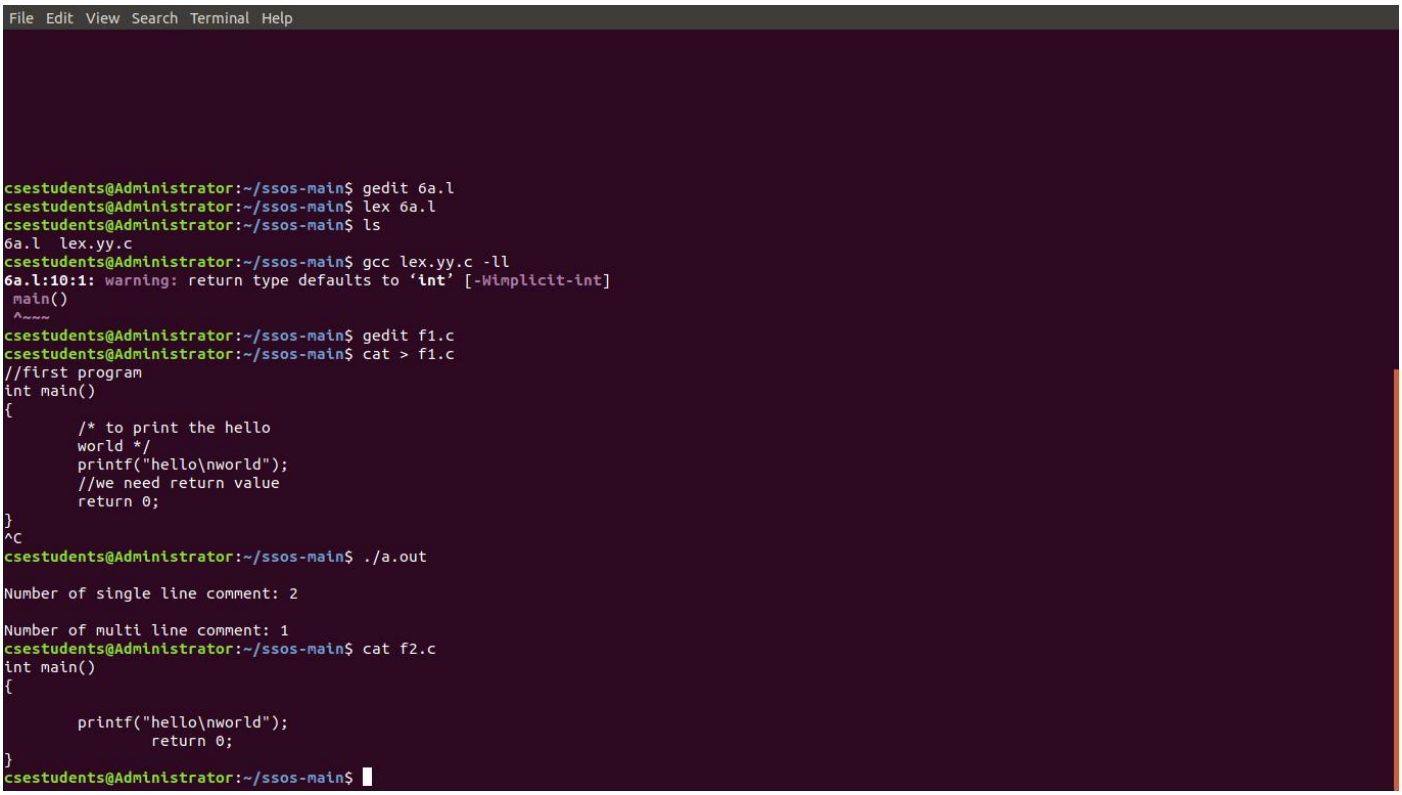


6 Six

6.1 6a.l

```
%{
#include<stdio.h>
int sl=0;
int ml=0;
%}
%%
"/*"[^"*/"]*"*/" ml++;
"//".*[\n] sl++;
%%
main()
{
        yyin=fopen("f1.c","r");
```

```
        yyout=fopen("f2.c","w");
        yylex();
        fclose(yyin);
        fclose(yyout);
        printf("\nNumber of single line comment: %d\n",sl);
        printf("\nNumber of multi line comment: %d\n",ml);
}
```



6.2 6B.L

```
%{
#include<stdio.h>
#include"y.tab.h"
extern yylval;
%}

%%
[\t] ;
[+|-|*|/|+|>|>] {printf("operator is %s\n",yytext);return OP;}
[0-9]+ {yylval=atoi(yytext); printf("numers is %d\n",yylval);return DIGIT;}
int|char|float|void|for|do|while|if|else|return|switch|case {printf("keyword is %s\n",yytext);return KEY;}
[a-zA-Z0-9]+ {printf("identifier is %s\n",yytext);return ID;}
. ;
%%
```

6.3 6B.Y

```
%{
#include<stdio.h>
#include<stdlib.h>
int id=0, dig=0, key=0, op=0;
%}

%token DIGIT OP KEY ID
```

```
%%
input:
DIGIT input {dig++;}
|ID input {id++;}
|KEY input {key++;}
|OP input {op++;}
|DIGIT {dig++;}
|ID {id++;}
|KEY {key++;}
|OP {op++;}
;
%%
#include<stdio.h>
extern int yylex();
extern int yyparse();
extern FILE *yyin;
main()
{
        FILE *mf=fopen("f1.c","r");
        if(!mf)
        {       ("cant open file");
                return -1;
        }
        yyin=mf;
        do{
        yyparse();
        }while(!feof(yyin));
        printf("numbers=%d\nkeywords=%d\nidentifiers=%d\noperators=%d\n",dig,key,id,op);
}
void yyerror()
{
        printf("error! message: ");
        exit(-1);
}
```

```
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ gedit 6b.l
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ gedit 6b.y
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ lex 6b.l
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ yacc -d 6b.y
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ gcc y.tab.c lex.yy.c -ll
y.tab.c: In function ‘yyparse’:
y.tab.c:1122:16: warning: implicit declaration of function ‘yylex’ [-Wimplicit-function-declaration]
       yychar = yylex ();
                ^
y.tab.c:1299:7: warning: implicit declaration of function ‘yyerror’ [-Wimplicit-function-declaration]
       yyerror (YY_("syntax error"));
       ^
6b.y: At top level:
6b.y:24:1: warning: return type defaults to ‘int’ [-Wimplicit-int]
 main()
 ^
6b.y:37:6: warning: conflicting types for ‘yyerror’
 void yyerror()
      ^
y.tab.c:1299:7: note: previous implicit declaration of ‘yyerror’ was here
       yyerror (YY_("syntax error"));
       ^
6b.l:4:8: warning: type defaults to ‘int’ in declaration of ‘yylval’ [-Wimplicit-int]
 extern yylval;
        ^
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ cat f1.c
#include<stdio.h>
int main()
{
        int a;
        int b;
        a=1;
        b=2;
        a=a+b;
        return 0;
}
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ ./a.out
identifier is include
identifier is stdio
identifier is h
operator is >

keyword is int
identifier is main
```

```
int main()
{
        int a;
        int b;
        a=1;
        b=2;
        a=a+b;
        return 0;
}
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$ ./a.out
identifier is include
identifier is stdio
identifier is h
operator is >

keyword is int
identifier is main


keyword is int
identifier is a

keyword is int
identifier is b

identifier is a
numers is 1

identifier is b
numers is 2

identifier is a
identifier is a
operator is +
identifier is b

keyword is return
numers is 0


numbers=3
keywords=4
identifiers=11
operators=2
csestudents@administrator-HP-Compaq-Pro-6300-MT:~/ssos$
```

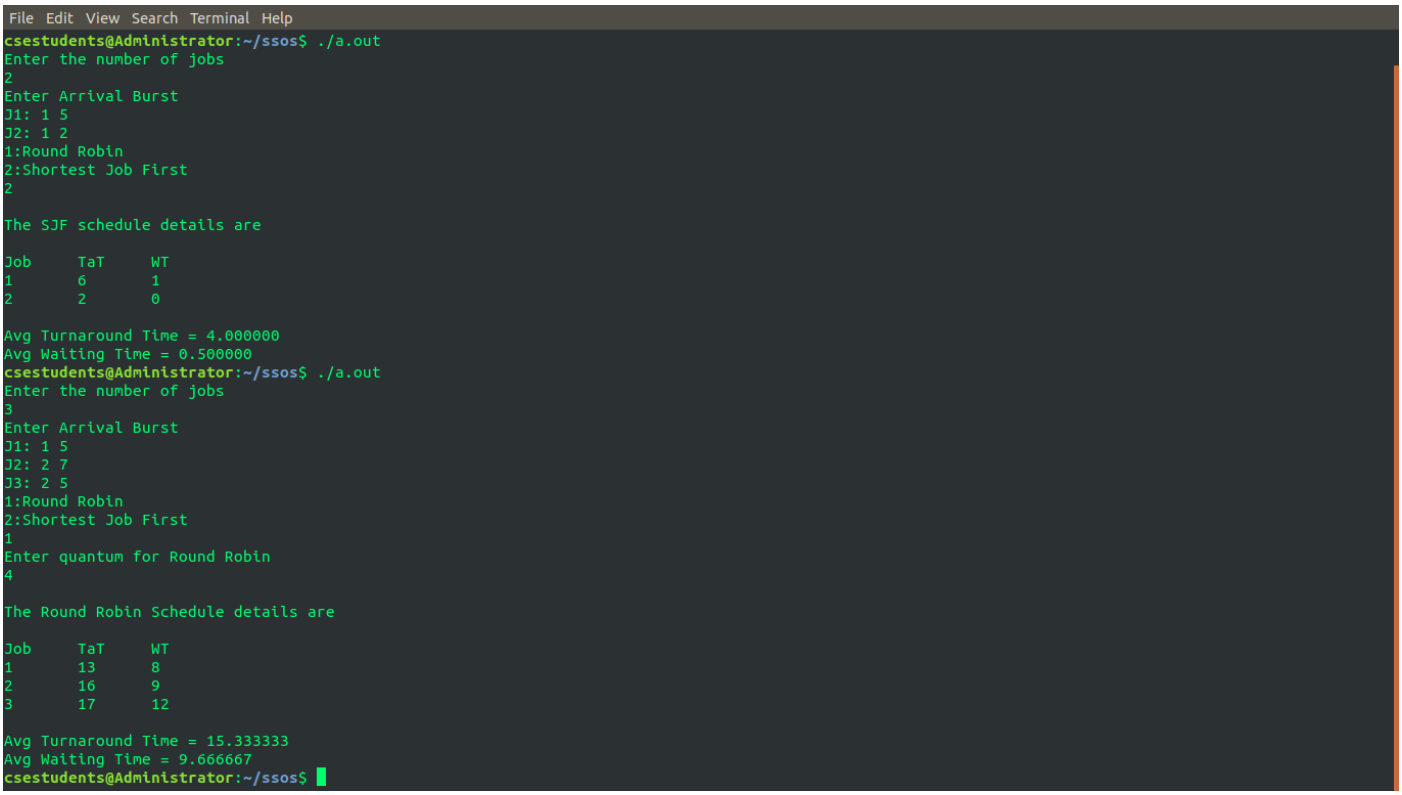
7 SEVEN

7.1 7.C

```
#include<stdio.h>
#include<stdlib.h>
typedef struct J
{
        int arrival,finish,burst,tat,wt;
}Job;
void scheduler(Job job[],int n,int q,int c)
{
        int bursts[100];
        for(int i=0;i<n;i++)
                bursts[i] = job[i].burst;
        int t = 0,done = 0, curr, diff;
        float tat_sum = 0,wt_sum = 0;
        if (c==0)
                curr = -1;
        else
                curr = 0;
        while (done<n)
        {
                if(c==1)
                {
                        for(int x=0;x<n;x++)
                        {
                                if(job[curr].burst == 0)
                                        curr = x;
                                if(job[x].burst < job[curr].burst)
                                        if(job[x].burst > 0 && job[x].arrival <= t)
                                                curr = x;
                        }
```

```
                diff = 1;
            }
            else
            {
                while(1)
                {
                    curr = (curr + 1) % n;
                    if(job[curr].burst != 0)
                        break;
                }
                diff = (q<=job[curr].burst)?q:job[curr].burst;
            }
            job[curr].burst -= diff;
            t += diff;
            if(job[curr].burst == 0)
            {
                done++;
                job[curr].finish = t;
            }
        }
        if(c==1)
            printf("\nThe SJF schedule details are\n");
        else
            printf("\nThe Round Robin Schedule details are\n");
        for (int i=0;i<n;i++)
            job[i].burst = bursts[i];
        printf("\nJob\tTaT\tWT\n");
        for(int i=0;i<n;i++)
        {
            job[i].tat = job[i].finish - job[i].arrival*c;
            job[i].wt = job[i].tat - job[i].burst;
            printf("%d\t%d\t%d\n",i+1 ,job[i].tat,job[i].wt);
            tat_sum += job[i].tat;
            wt_sum += job[i].wt;
        }
        printf("\nAvg Turnaround Time = %f\nAvg Waiting Time = %f\n",tat_sum/n, wt_sum/n);
}
int main()
{
        Job job[100];
        int n,q,c;
        printf("Enter the number of jobs\n");
        scanf("%d", &n);
        printf("Enter Arrival Burst\n");
        for(int i=0;i<n;i++)
        {
            printf("J%d: ",i+1);
            scanf("%d%d", &job[i].arrival, &job[i].burst);
        }
        printf("1:Round Robin\n2:Shortest Job First\n");
        scanf("%d",&c);
        switch (c)
        {
            case 1:
                printf("Enter quantum for Round Robin\n");
                scanf("%d",&q);
                scheduler(job, n, q, 0);
                break;
```

```
                case 2:scheduler(job, n, q, 1);
        }
}
```



```
File  Edit  View  Search  Terminal  Help
csestudents@Administrator:~/ssos$ ./a.out
Enter the number of jobs
2
Enter Arrival Burst
J1: 1 5
J2: 1 2
1:Round Robin
2:Shortest Job First
2

The SJF schedule details are

Job     TaT     WT
1       6       1
2       2       0

Avg Turnaround Time = 4.000000
Avg Waiting Time = 0.500000
csestudents@Administrator:~/ssos$ ./a.out
Enter the number of jobs
3
Enter Arrival Burst
J1: 1 5
J2: 2 7
J3: 2 5
1:Round Robin
2:Shortest Job First
1
Enter quantum for Round Robin
4

The Round Robin Schedule details are

Job     TaT     WT
1       13      8
2       16      9
3       17      12

Avg Turnaround Time = 15.333333
Avg Waiting Time = 9.666667
csestudents@Administrator:~/ssos$
```

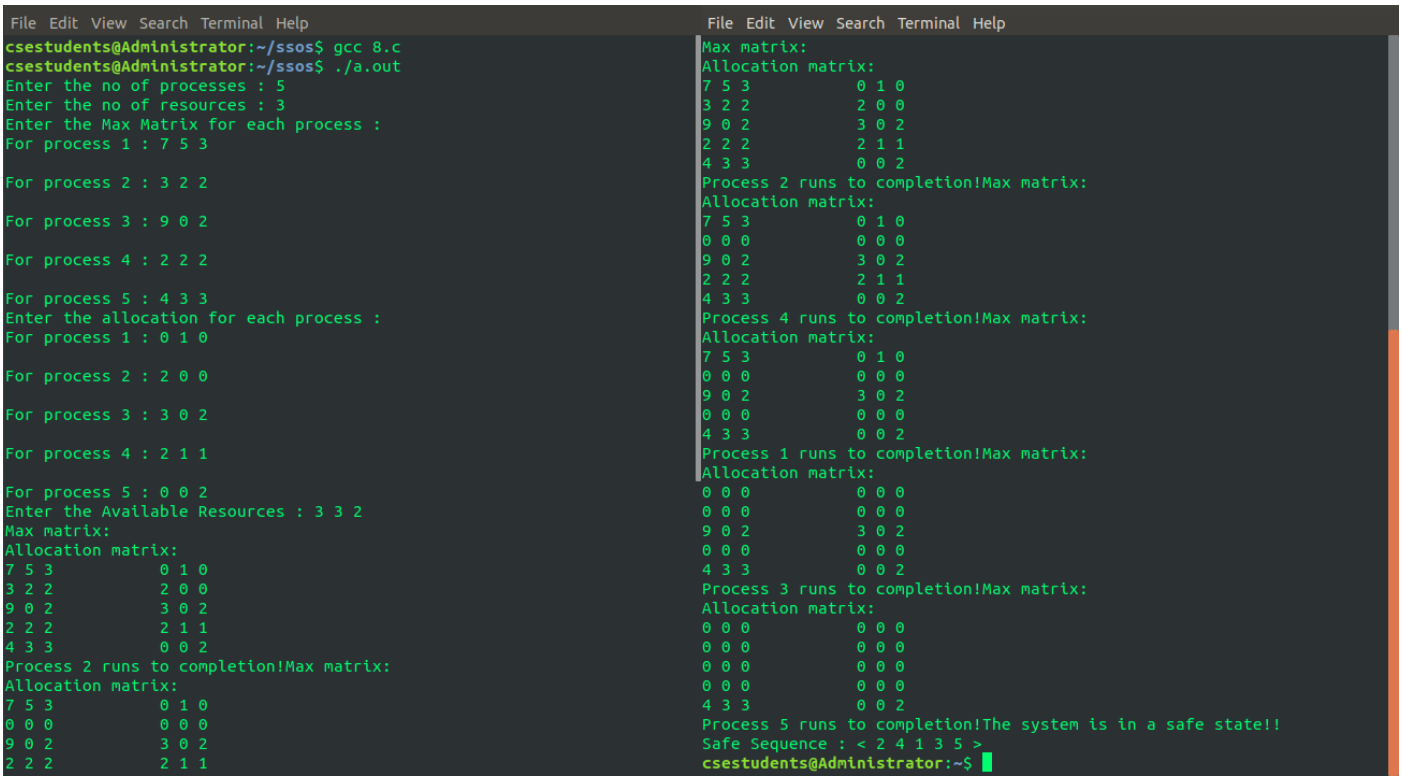
8 EIGHT

8.1 8.C

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
        int Max[10][10], need[10][10], alloc[10][10], avail[10], completed[10], safeSequence[10];
        int p, r, i, j, process, count;
        count = 0;
        printf("Enter the no of processes : ");
        scanf("%d", &p);
        for(i = 0; i< p; i++)
                completed[i] = 0;
        printf("Enter the no of resources : ");
        scanf("%d", &r);
        printf("Enter the Max Matrix for each process : \n");
        for(i = 0; i < p; i++)
        {
                printf("For process %d : ", i + 1);
                for(j = 0; j < r; j++)
                        scanf("%d", &Max[i][j]);
        }
        printf("Enter the allocation for each process : \n");
        for(i = 0; i < p; i++)
        {
                printf("For process %d : ",i + 1);
                for(j = 0; j < r; j++)
```

```
                scanf("%d", &alloc[i][j]);
}
printf("Enter the Available Resources : ");
for(i = 0; i < r; i++)
        scanf("%d", &avail[i]);
for(i = 0; i < p; i++)
        for(j = 0; j < r; j++)
                need[i][j] = Max[i][j] - alloc[i][j];
do
{
        printf("Max matrix:\t\tAllocation matrix:\n");
        for(i = 0; i < p; i++)
        {
                for( j = 0; j < r; j++)
                        printf("%d ", Max[i][j]);
                printf("\t\t");
                for( j = 0; j < r; j++)
                        printf("%d ", alloc[i][j]);
                printf("\n");
        }
        process = -1;
        for(i = 0; i < p; i++)
        {
                if(completed[i] == 0)//if not completed
                {
                        process = i ;
                        for(j = 0; j < r; j++)
                        {
                                if(avail[j] < need[i][j])
                                {
                                        process = -1;
                                        break;
                                }
                        }
                }
                if(process != -1)
                break;
        }
        if(process != -1)
        {
                printf("Process %d runs to completion!\n", process + 1);
                safeSequence[count] = process + 1;
                count++;
                for(j = 0; j < r; j++)
                {
                        avail[j] += alloc[process][j];
                        alloc[process][j] = 0;
                        Max[process][j] = 0;
                        completed[process] = 1;
                }
        }
}
while(count != p && process != -1);
if(count == p)
{
        printf("The system is in a safe state!!\n");
        printf("Safe Sequence : < ");
        for( i = 0; i < p; i++)
```

```
                printf("%d ", safeSequence[i]);
            printf(">\n");
        }
        else
            printf("The system is in an unsafe state!!");
}
```



9 NINE

9.1 9.C

```
#include<stdio.h>
#include<stdlib.h>
void FIFO(char s[],char F[],int l,int f)
{
            int i,j=0,k,flag=0;
            printf("PAGE\tFRAMES\tFAULTS");
            for(i=0;i<l;i++)
            {
                for(k=0;k<f;k++)
                    if(F[k]==s[i])
                        flag=1;
                printf("\n%c\t",s[i]);
                if(flag==0)
                {
                    F[j++]=s[i];
                    printf("%s",F);
                    printf("\tPage Fault");
                }
                else
                {
                    flag=0;
```

```
                        printf("%s",F);
                        printf("\tPage Hit");
                }
                if(j==f)
                        j=0;
        }
}
void lru(char s[],char F[],int l,int f)
{
        int i,j=0,k,m,flag=0,top=0;
        printf("\nPAGE\t FRAMES\t FAULTS");
        for(i=0;i<l;i++)
        {
                for(k=0;k<f;k++)
                        if(F[k]==s[i])
                                flag=1;
                printf("\n%c\t",s[i]);
                if(j!=f && flag!=1)
                {
                        F[top]=s[i];
                        if(++j!=f)
                                top++;
                }
                else
                {
                        if(flag!=1)
                        {
                                for(k=0;k<top;k++)
                                        F[k]=F[k+1];
                                F[top]=s[i];
                        }
                        else
                        {
                                for(m=k;m<top;m++)
                                        F[m]=F[m+1];
                                F[top]=s[i];
                        }
                }
        printf("%s",F);
        if(flag==0)
                printf("\tPage Fault");
        else
                printf("\tPage Hit");
        flag=0;
        }
}
void main()
{
        int ch,i,l,f;
        char F[10],s[25];
        printf("Enter the no. of frames: ");
        scanf("%d",&f);
        F[f]='\0';
        printf("Enter the length of the string: ");
        scanf("%d",&l);
        printf("Enter the string: ");
        scanf("%s",s);
        while(1)
```

```
        {
                printf("\nEnter:\n1:FIFO\n2:LRU\n3:EXIT\n");
                scanf("%d",&ch);
                switch(ch)
                {
                        case 1:  for(i=0;i<f;i++)
                                        F[i]=-1;
                                FIFO(s,F,l,f);
                                break;
                        case 2:  for(i=0;i<f;i++)
                                        F[i]=-1;
                                lru(s,F,l,f);
                                break;
                        case 3:  exit(0);
                }
        }
}
```

```
dev@dev:~/ssos-main$ gedit 9.c
dev@dev:~/ssos-main$ gcc 9.c
dev@dev:~/ssos-main$ ./a.out
Enter the no. of frames: 5
Enter the length of the string: 10
Enter the string: abababababab

Enter:
1:FIFO
2:LRU
3:EXIT
1
PAGE    FRAMES  FAULTS
a       a****   Page Fault
b       ab***   Page Fault
a       ab***   Page Hit
b       ab***   Page Hit
a       ab***   Page Hit
b       ab***   Page Hit
a       ab***   Page Hit
b       ab***   Page Hit
a       ab***   Page Hit
b       ab***   Page Hit
Enter:
1:FIFO
2:LRU
3:EXIT
2

PAGE     FRAMES  FAULTS
a       a****   Page Fault
b       ab***   Page Fault
a       aba**   Page Hit
b       abb**   Page Hit
a       aba**   Page Hit
b       abb**   Page Hit
a       aba**   Page Hit
b       abb**   Page Hit
a       aba**   Page Hit
b       abb**   Page Hit
Enter:
1:FIFO
2:LRU
3:EXIT
3
dev@dev:~/ssos-main$
```