

## System Software Assignment 8

U20CS005

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1. Write a YACC and LEX program to implement a Calculator and recognize a valid arithmetic expression that uses operator +, -, \*, /.

**Lex program:**

```
%{
    #include<stdio.h>
    #include "y.tab.h"
    extern int yylval;
}%
%%
[0-9]+ {yylval=atoi(yytext);return NUMBER;}
[t] ;
[\n] return 0;
. return yytext[0];
%%
int yywrap()
{
    return 1;
}
```

**Yacc program:**

```
%{
    #include<stdio.h>
    int flag=0;
    void yyerror(const char *str)
    {
        printf("\nEntered arithmetic expression is Invalid");
        flag=1;
    }
}%
%token NUMBER
%left '+' '-'
%left '*' '/'
%left '(' ')'
%%
ArithmeticExp: E{printf("Answer is: %d", $$);return 0;};
E: E '+' E {$$=$1+$3;}
| E '-' E {$$=$1-$3;}
| E '*' E {$$=$1*$3;}
| E '/' E {$$=$1/$3;}
| E '%' E {$$=$1%$3;}
| '(' E ')' {$$=$2;}
```

```
| NUMBER {$$=$1;};
%%
void main()
{
    printf("Enter an arithmetic expression: ");
    yyparse();
    if(!flag)
        printf("\nEntered arithmetic expression is Valid");
}
```

```
PS D:\BANSI MARAKANA\Yacc> ./a
Enter an arithmetic expression: 3+(4*5)-7
Answer is: 16
Entered arithmetic expression is Valid
```

## 2. Write a YACC and LEX program to check whether a given string is palindrome or not.

### Lex program:

```
%{
    #include <stdio.h>
    #include "y.tab.h"
}%
%%
[a-zA-Z]+ {yylval.f = yytext; return String;}
[-+()*/] {return yytext[0];}
[\n]      {return 0;}
%%
int yywrap()
{
    return 1;
}
```

### Yacc program:

```
%{
    #include <stdio.h>
    #include<stdlib.h>
    #include <string.h>
    extern int yylex();
    void yyerror(char *str);
    int flag, i, k = 0;
}%
%union {
    char* f;
}
%token <f> String
%type <f> E
%%
```

```

S : E {
    flag = 0;
    k = strlen($1) - 1;
    if(k%2==0)
    {
        for (i = 0; i <= k/2; i++)
            if ($1[i] == $1[k-i]);
            else
                flag = 1;
        if (flag == 1)
            printf("Entered string is not palindrome\n");
        else
            printf("Entered string is palindrome\n");
    }
    else
    {
        for (i = 0; i < k/2; i++)
            if ($1[i] == $1[k-i]);
            else
                flag = 1;
        if (flag == 1)
            printf("Entered string is not palindrome\n");
        else
            printf("Entered string is palindrome\n");
    }
};
E : String {$$ = $1;};
%%
void yyerror(char *str)
{
    fprintf(stderr, "%s\n", str);
    exit(1);
}
void main()
{
    printf("Enter a string: ");
    yyparse();
}

```

```

PS D:\BANSI MARAKANA\Yacc> ./a
Enter a string: ABCDCDCSA
Entered string is not palindrome
PS D:\BANSI MARAKANA\Yacc> ./a
Enter a string: abcdcdcba
Entered string is palindrome

```

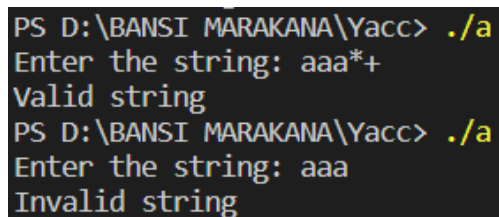
**3. Write a program for implementing given grammar for computing the expression using semantic rules of the YACC tool and LEX. Grammar:  $S \rightarrow SS^* \mid SS^+ \mid a$**

**Lex program:**

```
%{
    #include<stdio.h>
    #include "y.tab.h"
    extern int yylval;
}%
%%
a {yylval = 0;return A;}
[*] {yylval = 1;return B;}
[+] {yylval = 2;return C;}
.\n {yylval = 3;return 0;}
%%
int yywrap()
{
    return 1;
}
```

**Yacc program:**

```
%{
    #include<stdio.h>
    #include<stdlib.h>
    int yyerror(char *msg)
    {
        printf("Invalid string\n");
        exit(0);
    }
}%
%token A B C
%%
R : S {printf("Valid string\n");};
S : S S B | S S C | A;
%%
void main()
{
    printf("Enter the string: ");
    yyparse();
}
```



```
PS D:\BANSI MARAKANA\Yacc> ./a
Enter the string: aaa*+
Valid string
PS D:\BANSI MARAKANA\Yacc> ./a
Enter the string: aaa
Invalid string
```

#### 4. Write a YACC and LEX program to accept strings that start and end with 0 or 1.

##### Lex program:

```
%{
    extern int yyval;
    #include "y.tab.h"
}%
%%
0 {yyval = 0; return Zero;}
1 {yyval = 1; return One;}
.|\\n {yyval = 2; return 0;}
%%
int yywrap()
{
    return 1;
}
```

##### Yacc program:

```
%{
    #include<stdio.h>
    #include<stdlib.h>
    void yyerror(const char *str)
    {
        printf("String Rejected!!\\n");
        exit(0);
    }
}%
%token Zero One
%%
r : s {printf("String Accepted!!\\n");};
s : n | One a | Zero b;
n : Zero | One;
a : n a | One;
b : n b | Zero;
%%
void main()
{
    printf("Enter a string to check whether it starts and ends with 0/1 or not: ");
    yyparse();
}
```

```
PS D:\BANSI MARAKANA\Yacc> ./a
Enter a string to check whether it ends with 0/1 or not: 1001
String Accepted!!
PS D:\BANSI MARAKANA\Yacc> ./a
Enter a string to check whether it ends with 0/1 or not: 100
String Rejected!!
```