Nithin S
221IT085

IT250 Lab Assignment 6

Q1. John is a newbie programmer. He has a string which is an arithmetic expression, he is struggling to find the result of this string by creating a YACC program. He also wants to know whether arithmetic expression is valid or not. John needs your help to write the YACC program.

CODE

Lex Code 1.l

```
%{
    #include "y.tab.h"
    extern int yylval;
%}

%%

[0-9.0-9]+      {
                yylval = atoi(yytext);
                return NUMBER;
            }

[ \t]+          ;

.           { return yytext[0]; }

[a-zA-Z)]+    { return 0; }

\n          { return 0; }

%%

int yywrap(){
    return 1;
}
```

Yacc Code 1.y

```
%{
  #include <stdio.h>
  #include <stdlib.h>
  int yylex(void);
  void yyerror(char *msg);
  int pwr(int,int);
%}

%token ID NUMBER

%left '+' '-'
%left '*' '/' '%'
%left '^'

%%
stat : exp    { printf("Valid\n%d\n\n", $$); return 0;}

exp :
    exp '+' exp { $$ = $1 + $3; }
    | exp '-' exp { $$ = $1 - $3; }
    | exp '*' exp { $$ = $1 * $3; }
    | exp '/' exp { $$ = $1 / $3;
      if($3 == 0){
            printf("Division by Zero!!");
            exit(0);
        }}
    | exp '%' exp { $$ = $1 % $3; }
    | exp '^' exp { $$ = pwr($1,$3); }
    | '-' ID { $$ = -$2; }
    | '-' NUMBER { $$ = -$2; }
    | '(' exp ')' { $$ = $2; }
    | ID { $$ = $1;}
    | NUMBER { $$ = $1;}
    | error { exit(0);}
    ;
%%

int main() {
    printf("Enter the expression: ");
    yyparse();
}

void yyerror(char *msg) {
    printf("Invalid\n\n");
}

int pwr(int a, int b){
    int result = 1;
    for(int i=0; i<b; i++){
        result *= a;
    }
    return result;
}
```

Ouput

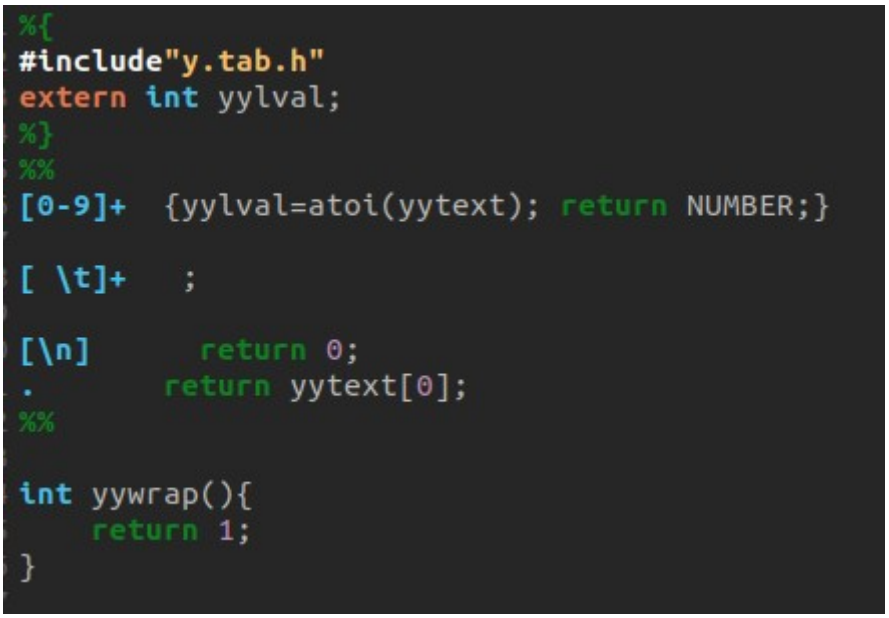
```
student@HP-Elite600G9-08:~/Desktop/assgn$ lex 1.l
student@HP-Elite600G9-08:~/Desktop/assgn$ yacc -d 1.y
student@HP-Elite600G9-08:~/Desktop/assgn$ cc lex.yy.c y.tab.c -ll
student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: (( 7 * 2 - 12 * 1 + 2) / 7) % 3
Valid
0

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: (2 * 4) + (4 / 5) + 5 - 2 - 1 * 7 %
Invalid

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: (5 ^ 12 * 4 / 2486 + ( 578 - 124) / 4))
Invalid

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: 4 * 3.142 * r * r
Invalid

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: 2+3
Valid
5
```

```
student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: 6+(4-5)
Valid
5

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: (7+1)+(8+0)
Valid
16

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: 7^*9
Invalid

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter the expression: 6%7*6
Valid
36

student@HP-Elite600G9-08:~/Desktop/assgn$
```

Q2.Zayan is throwing a birthday party. Seeing the extravagant parties thrown by her friends like Varaa and Arik in the past, Zayan too decided to do something unique. Being a Computer Engineer himself, he knew just how to do it. He sent a password-protected e-invites(string) to his friends. Now their task is to convert the given string which is an infix expression to a postfix expression and to find the result of that string. Underscore separated postfix expression and result which would be the password for that invite. Help Zayan friends in finding the password so that they can enjoy the birthday party!

Code

Lex Code 2.l



```
%{
#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 Code 2.y

```
%{
    #include<stdio.h>
    #include<stdlib.h>
    #include<string.h>
    int yylex(void);
    int yyerror(char *msg);
    int pwr(int, int);
    char password[100] = "";
    int i=0;
%}


%token NUMBER

%left '+' '-'
%left '*' '/' '%'
%left '^'


%%

stat:  exp {printf("\n%d\n%s_%d\n\n", $$, password, $$);}
    ;


exp:      exp '+' exp {printf("+"); $$ = $1 + $3; password[i++] = '+';}

    |   exp '*' exp {printf("*");$$ = $1 * $3; password[i++] = '*';}
    |   exp '-' exp {printf("-");$$ = $1 - $3; password[i++] = '-';}
    |   exp '/' exp {printf("/");
        if($3 == 0){
            printf("Division by Zero!!");
            exit(0);
        }
        $$ = $1 / $3; password[i++] = '/';}
    |   exp '%' exp {printf("%%");$$ = $1 % $3; password[i++] = '%';}
    |   exp '^' exp {printf("^");$$ = $1^$3; password[i++] = '^';}
    |   '(' exp ')' {$$ = $2; }


    |   NUMBER     {printf("%d ", yylval);


            int temp = yylval;
            int count = 0;


            while (temp > 0) {
                count++;
                temp /= 10;
            }
```

```
            while (count > 0) {
                int digit = (yylval / pwr(10, count-1)) % 10;
                password[i++] = (char)(digit + 48);
                count--;
        }}



    | error { exit(0); }
    ;
%%


int main(){
    printf("Enter Expressoin: ");
    yyparse();
}

int pwr(int a, int b){
    int result = 1;
    for(int i=0; i<b; i++){
        result *= a;
    }
    return result;
}

int yyerror (char *msg) {
    return printf ("\nInvalid exp\n");
}
```

OUTPUT

```
student@HP-Elite600G9-08:~/Desktop/assgn$ lex 2.l
student@HP-Elite600G9-08:~/Desktop/assgn$ yacc -d 2.y
student@HP-Elite600G9-08:~/Desktop/assgn$ cc lex.yy.c y.tab.c -ll
student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter Expressoin: 8 - 15 / (5 * 3) + 10
8 15 5 3 */-10 +
17
81553*/-10+_17

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter Expressoin: (( (7 % 2) - 12 / 12 * 8) + 3) % 20
7 2 %12 12 /8 *-3 +20 %
-4
72%1212/8*-3+20%_-4

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter Expressoin: (55 ^ 12 )* (4 / 2486) + ( 578 - 124) % 351
55 12 ^4 2486 /*578 124 -351 %+
103
5512^42486/*578124-351%+_103

student@HP-Elite600G9-08:~/Desktop/assgn$
```

```
student@HP-Elite600G9-08:~/Desktop/assgn$ lex 2.l
student@HP-Elite600G9-08:~/Desktop/assgn$ yacc -d 2.y
student@HP-Elite600G9-08:~/Desktop/assgn$ cc lex.yy.c y.tab.c -ll
student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter Expressoin: 2+3
2 3 +
5
23+_5

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter Expressoin: (2-3+4)*(5+6*7)
2 3 -4 +5 6 7 *+*
141
23-4+567*+*_141

student@HP-Elite600G9-08:~/Desktop/assgn$ ./a.out
Enter Expressoin: 2*3+4*5
2 3 *4 5 *+
26
23*45*+_26

student@HP-Elite600G9-08:~/Desktop/assgn$
```